Update on CT Lung Cancer Screening in Japan

Ryutaro Kakinuma, MD

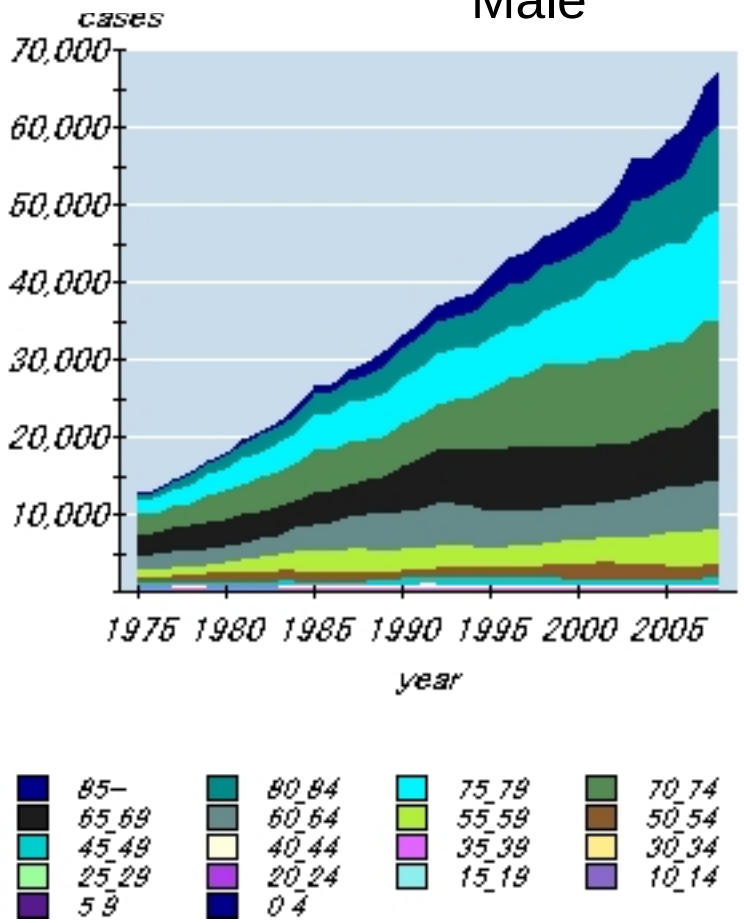
National Cancer Center
Research Center for Cancer Prevention and Screening
Tokyo, Japan

Disclosure slide

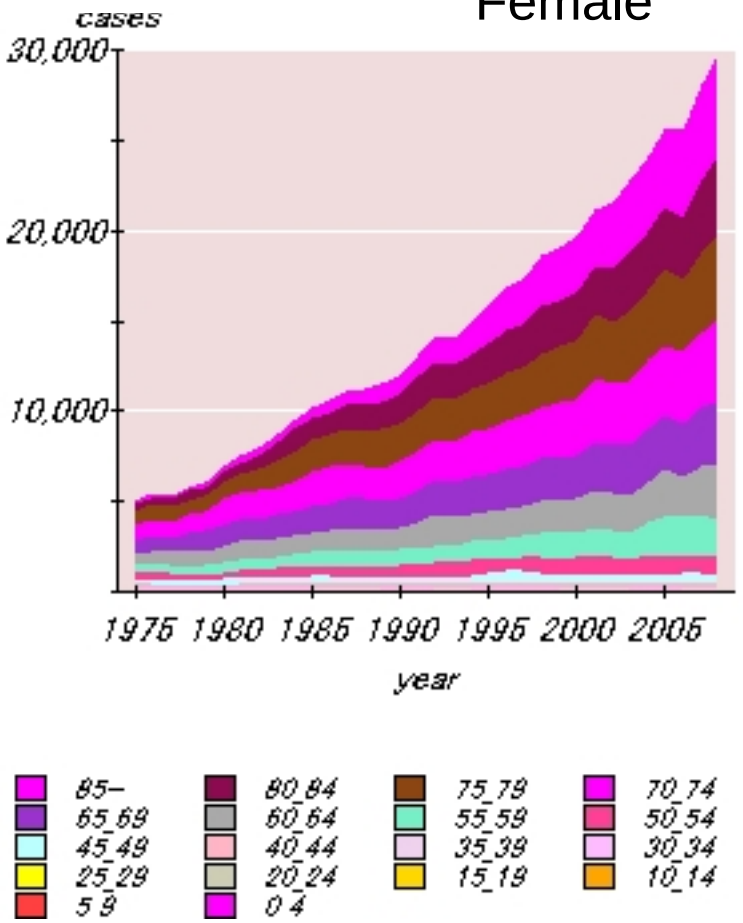
- **Nothing to Declare**

Trends in Incidence of Lung Cancer According to Age 1975 - 2008

Male

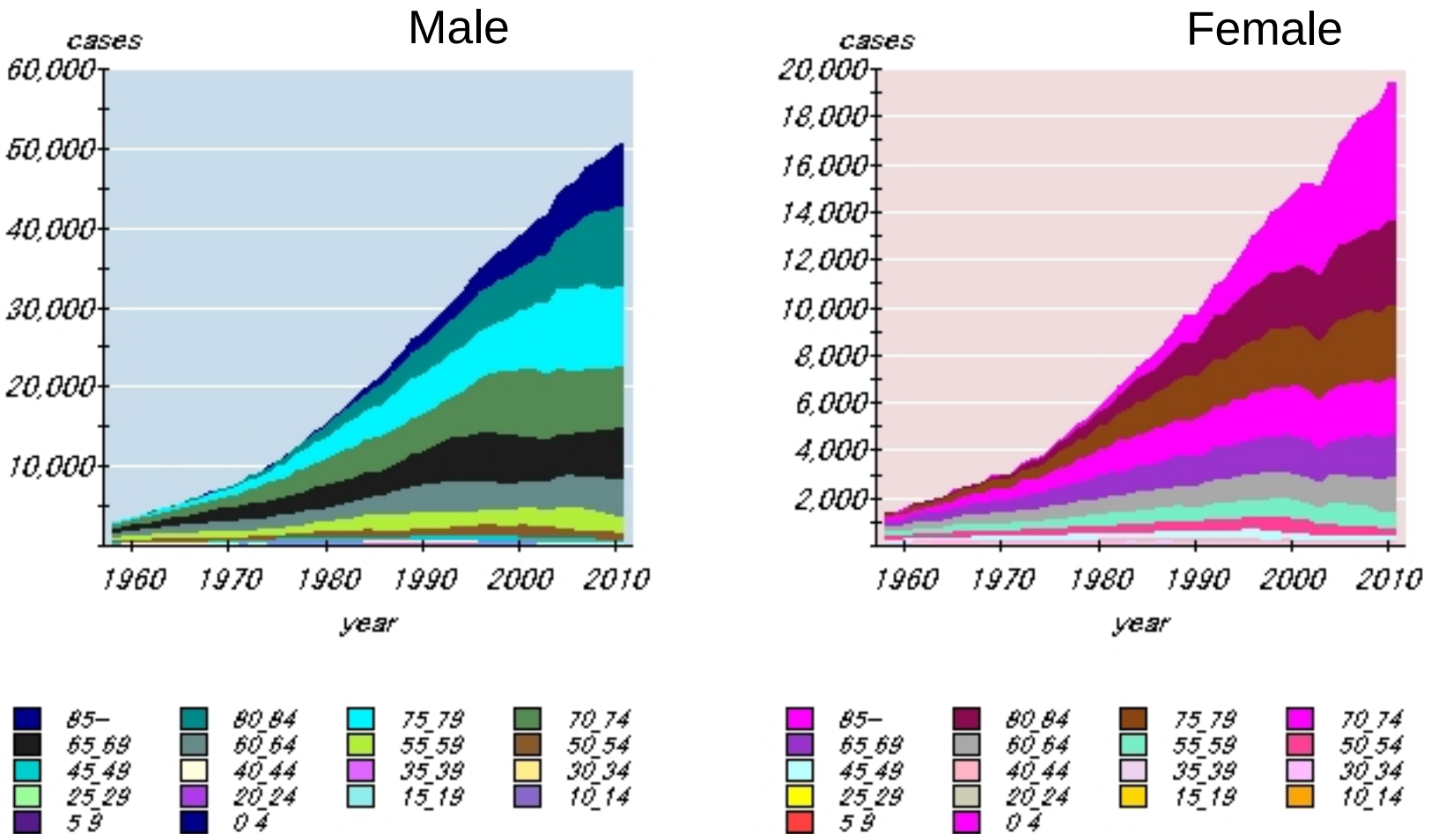


Female



(c) Center for Cancer Control and Information Services, National Cancer Center

Trends in Lung Cancer Mortality According to Age 1958 - 2011

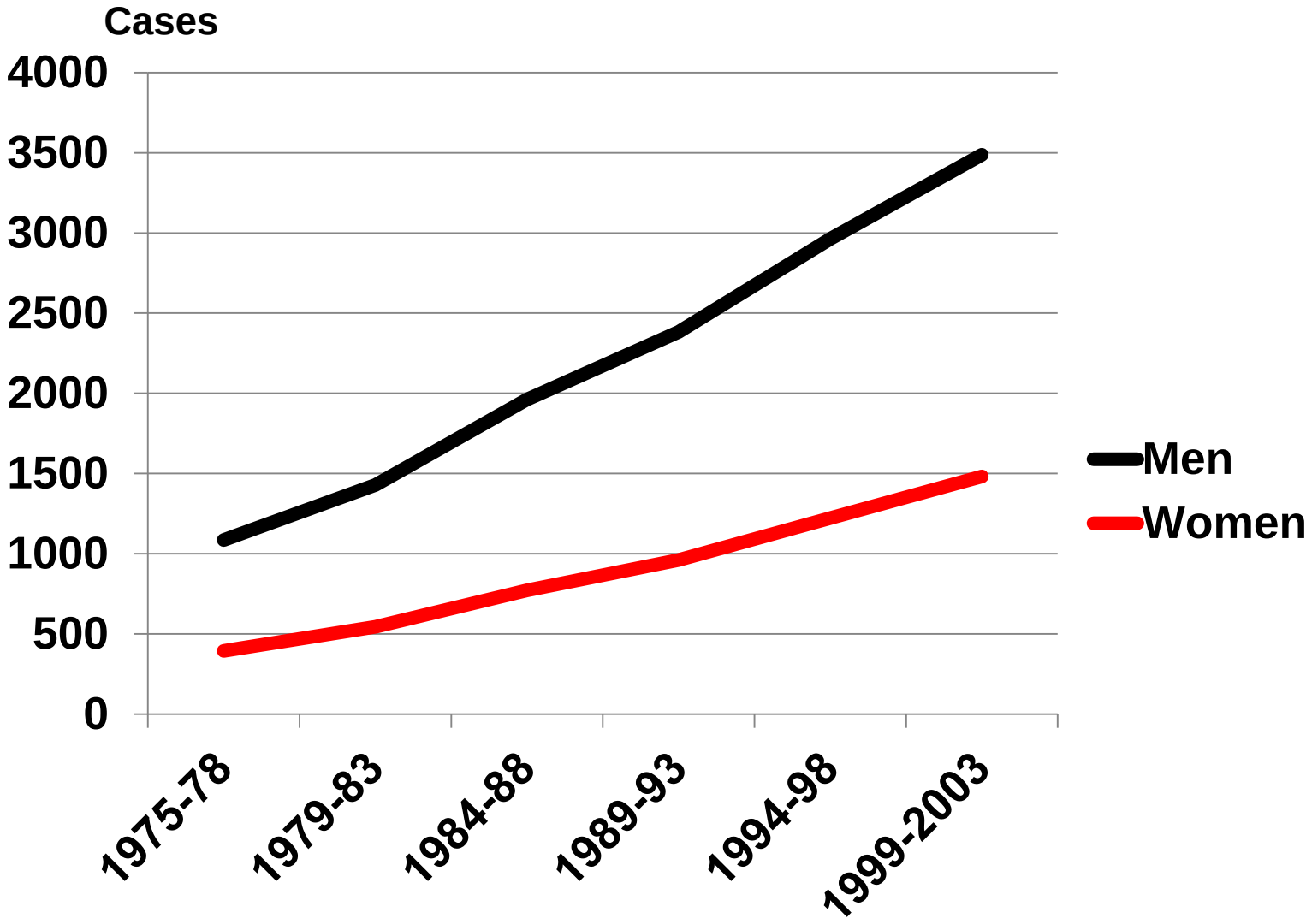


(c) Center for Cancer Control and Information Services, National Cancer Center

Trends in Lung Cancer Incidence by Histological Type in Osaka, Japan

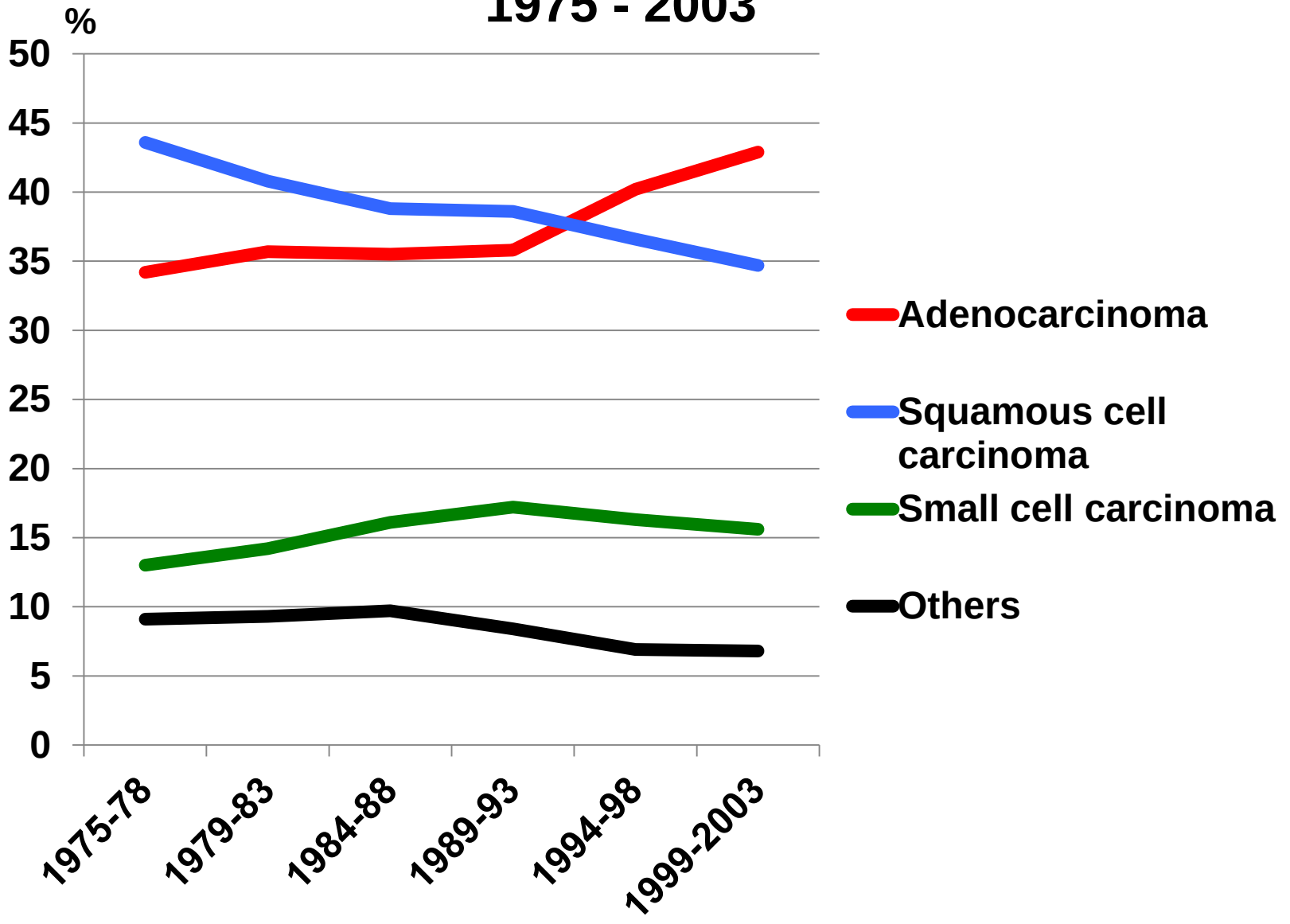
Toyoda et al. Jpn J Clin Oncol 2008

Trends in the Number of Lung Cancer Incidence Per Year According to All Histological Type in Osaka, Japan 1975 - 2003



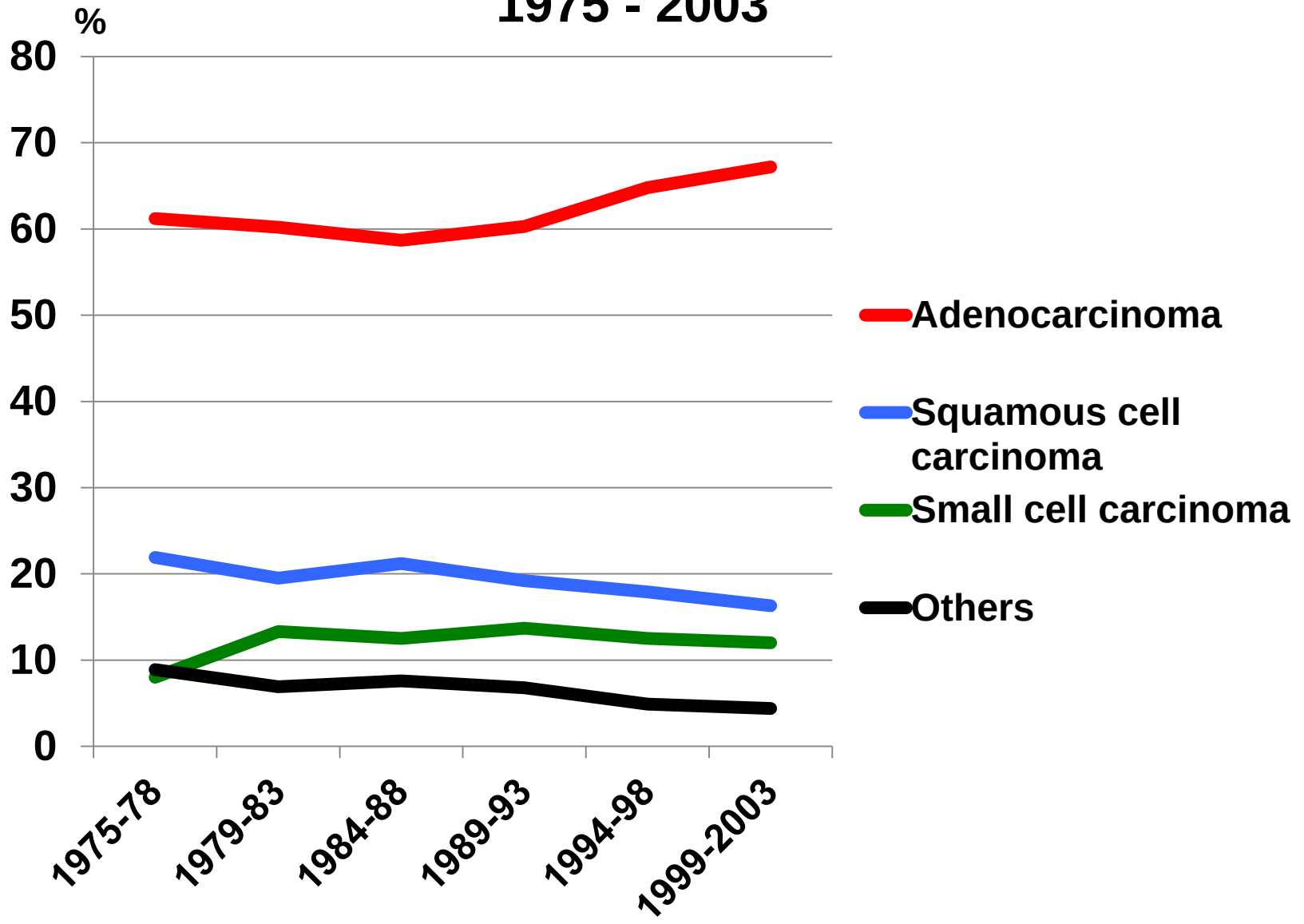
Toyoda et al. Jpn J Clin Oncol 2008

Trends in the Number of Lung Cancer Incidence Per Year According to Histological Type in Men 1975 - 2003



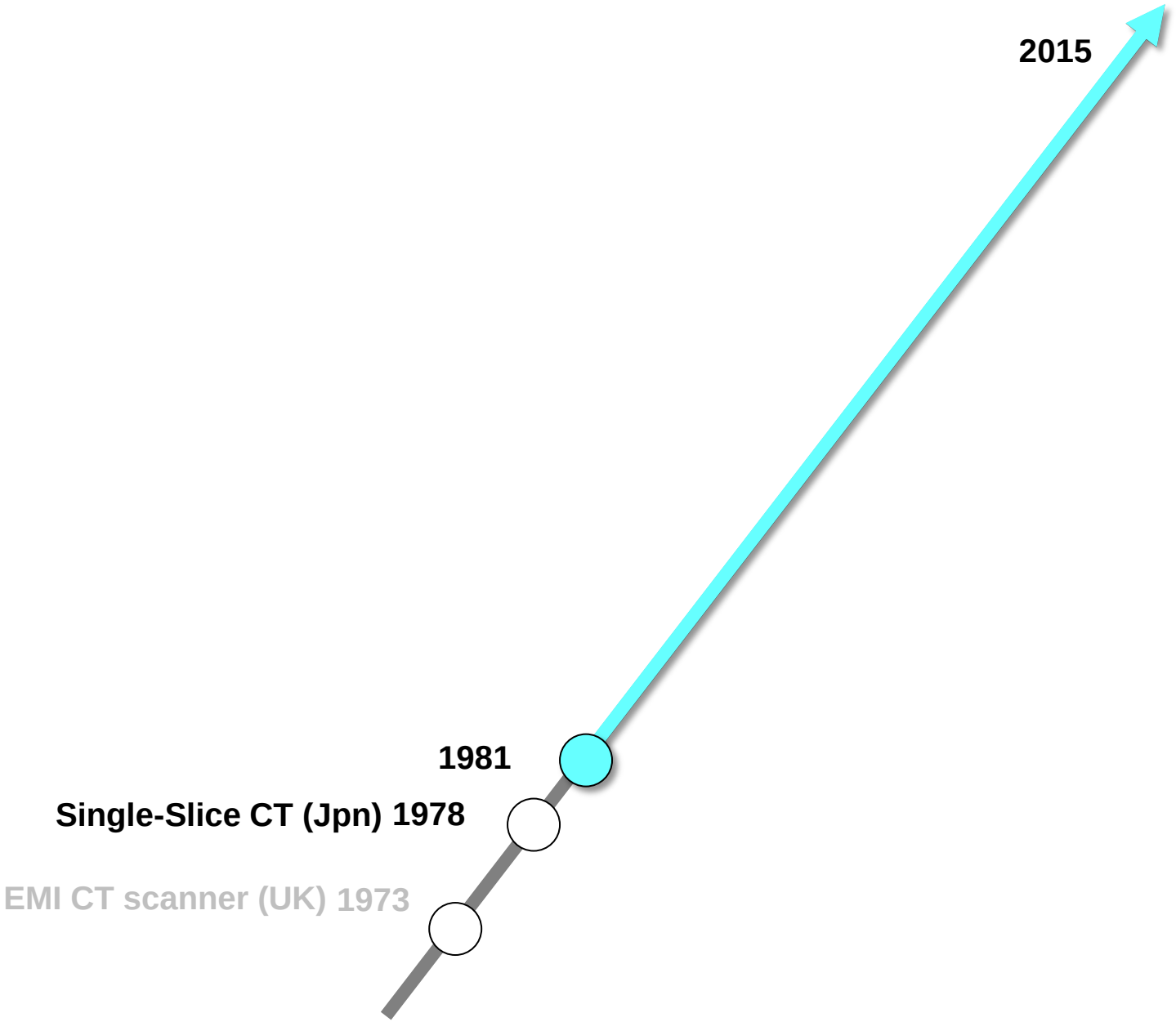
Toyoda et al. Jpn J Clin Oncol 2008

Trends in the number of lung cancer incidence per year according to histological type in Women 1975 - 2003



Toyoda et al. Jpn J Clin Oncol 2008

Experience in Reading of Chest CT



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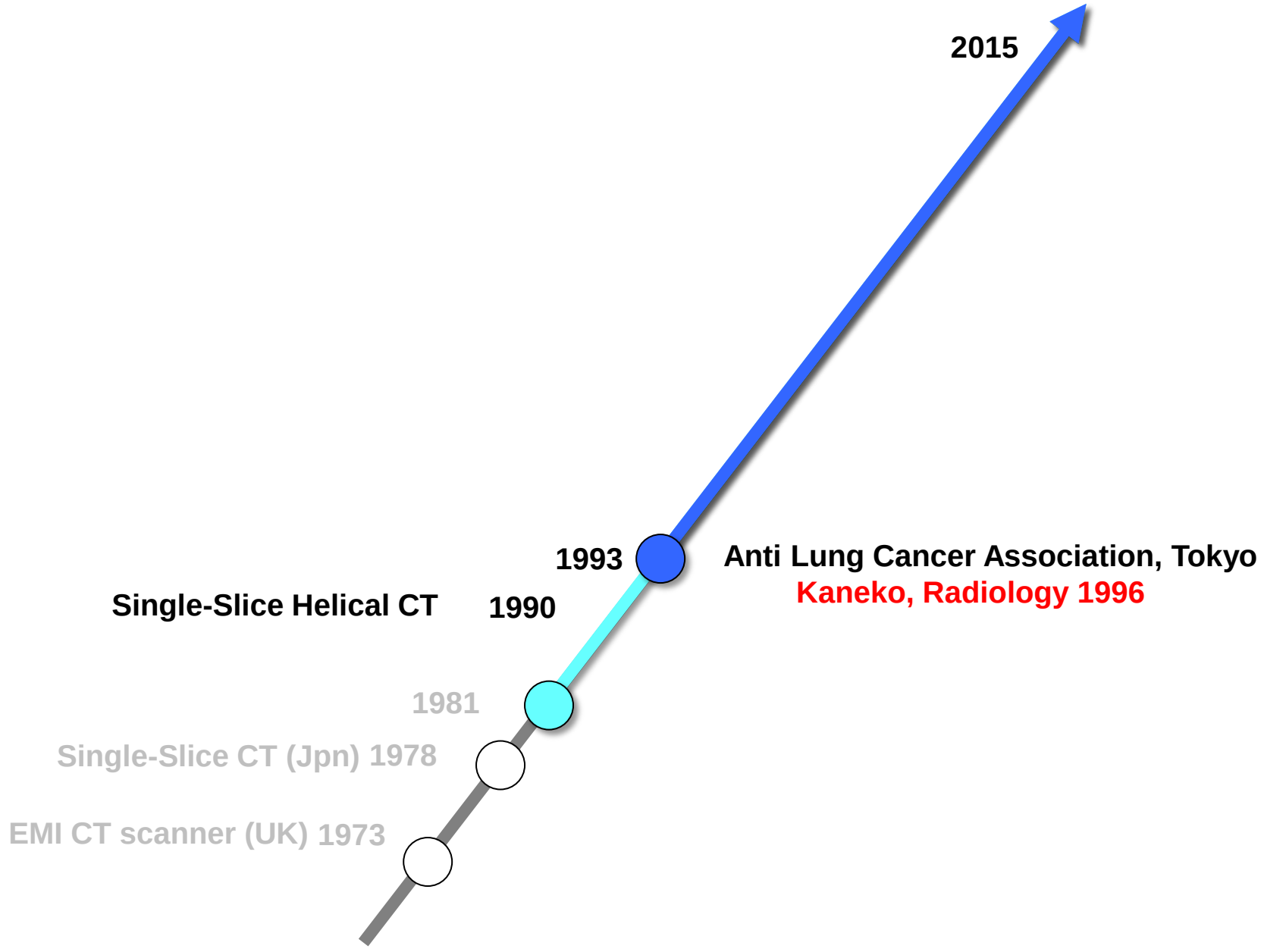

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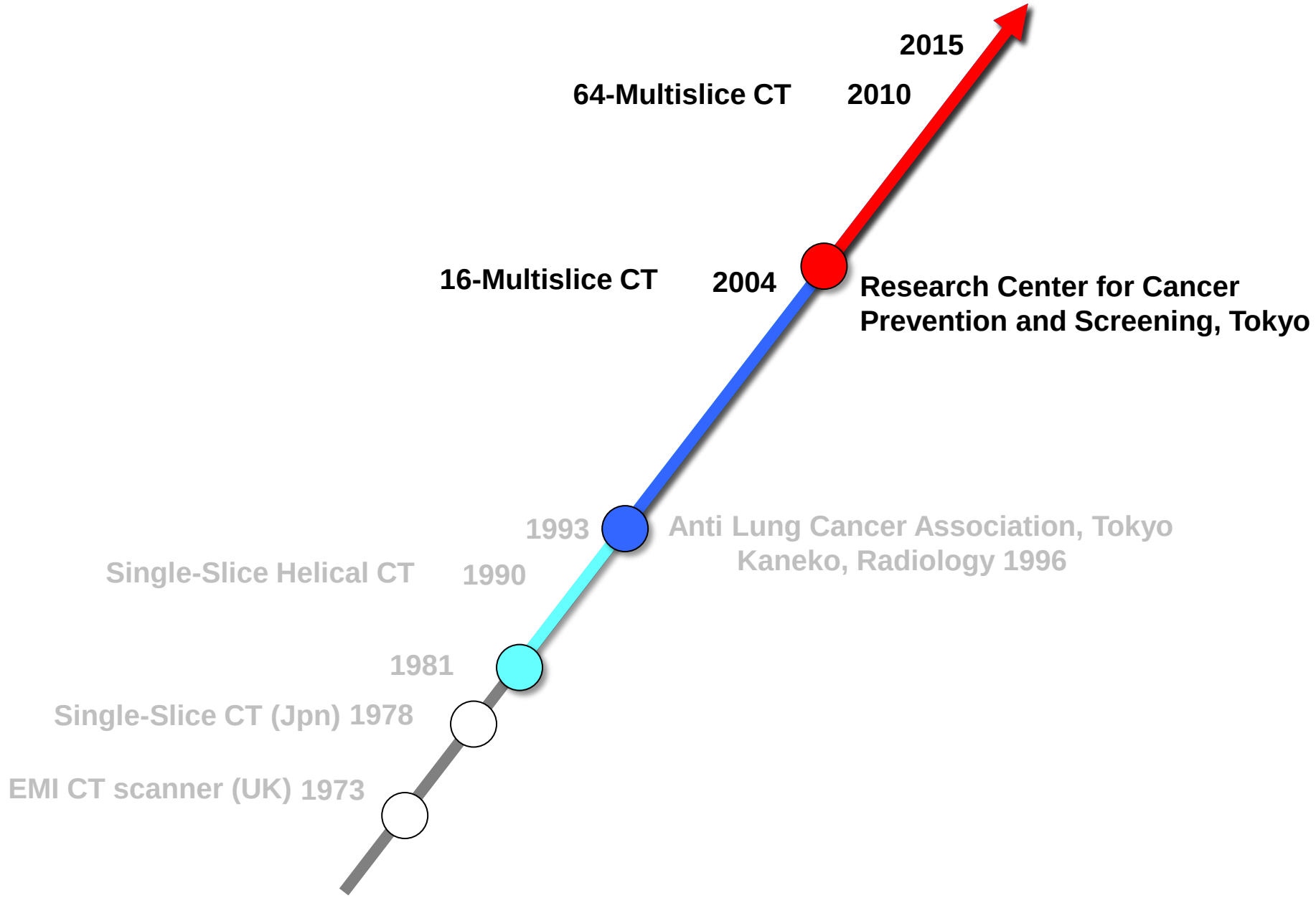
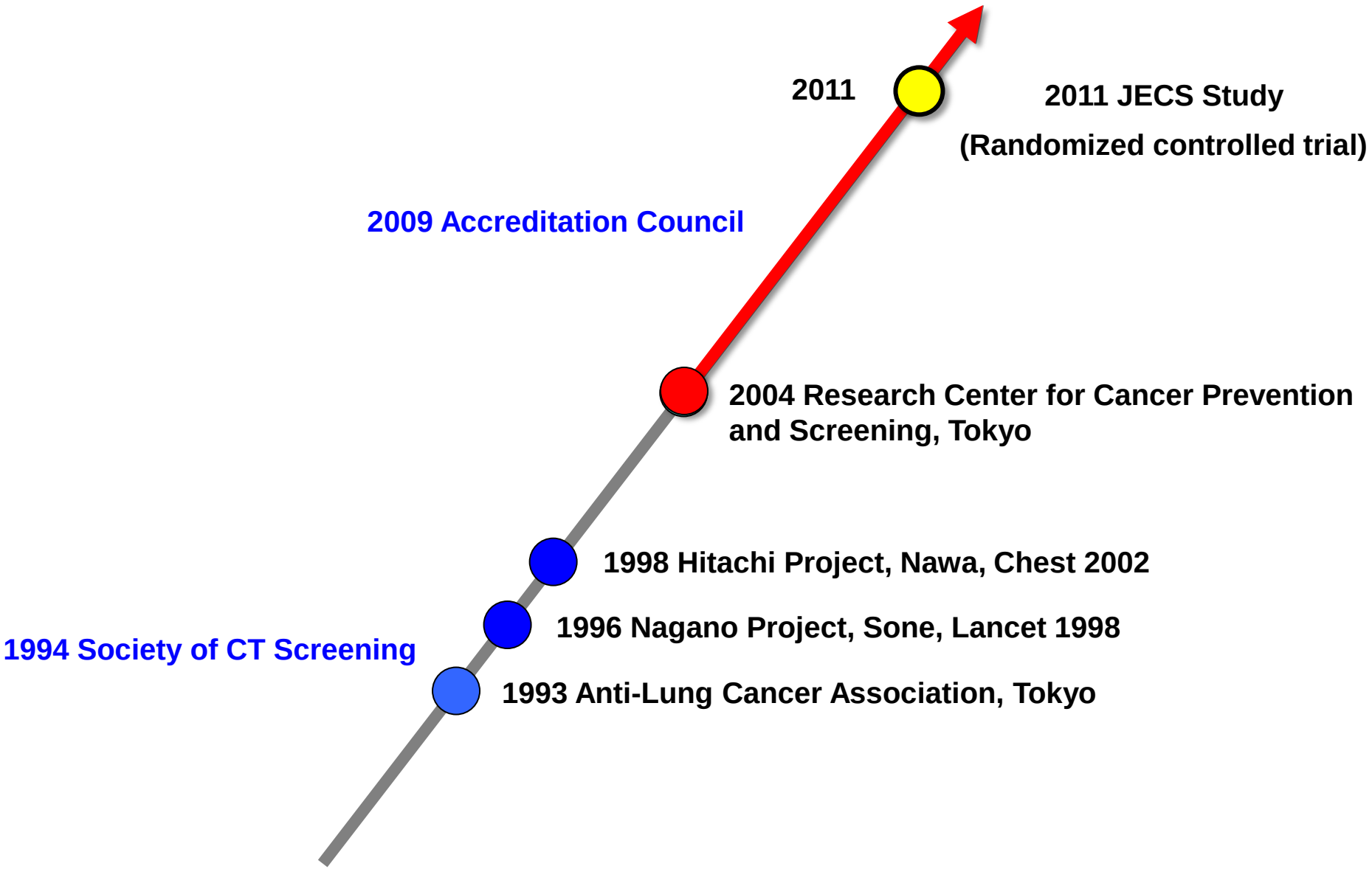
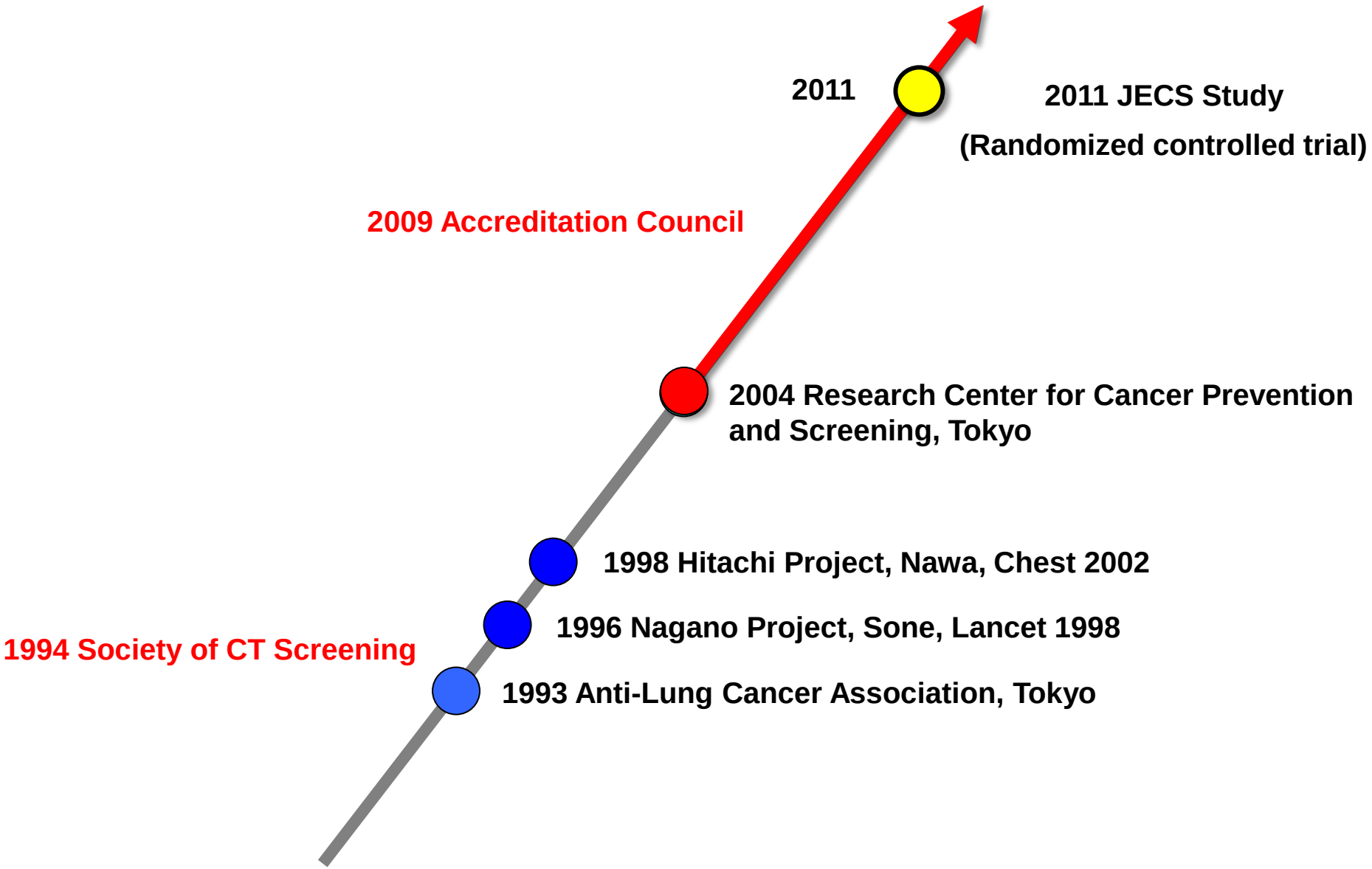


CT Lung Cancer Screening in Japan



CT Lung Cancer Screening in Japan



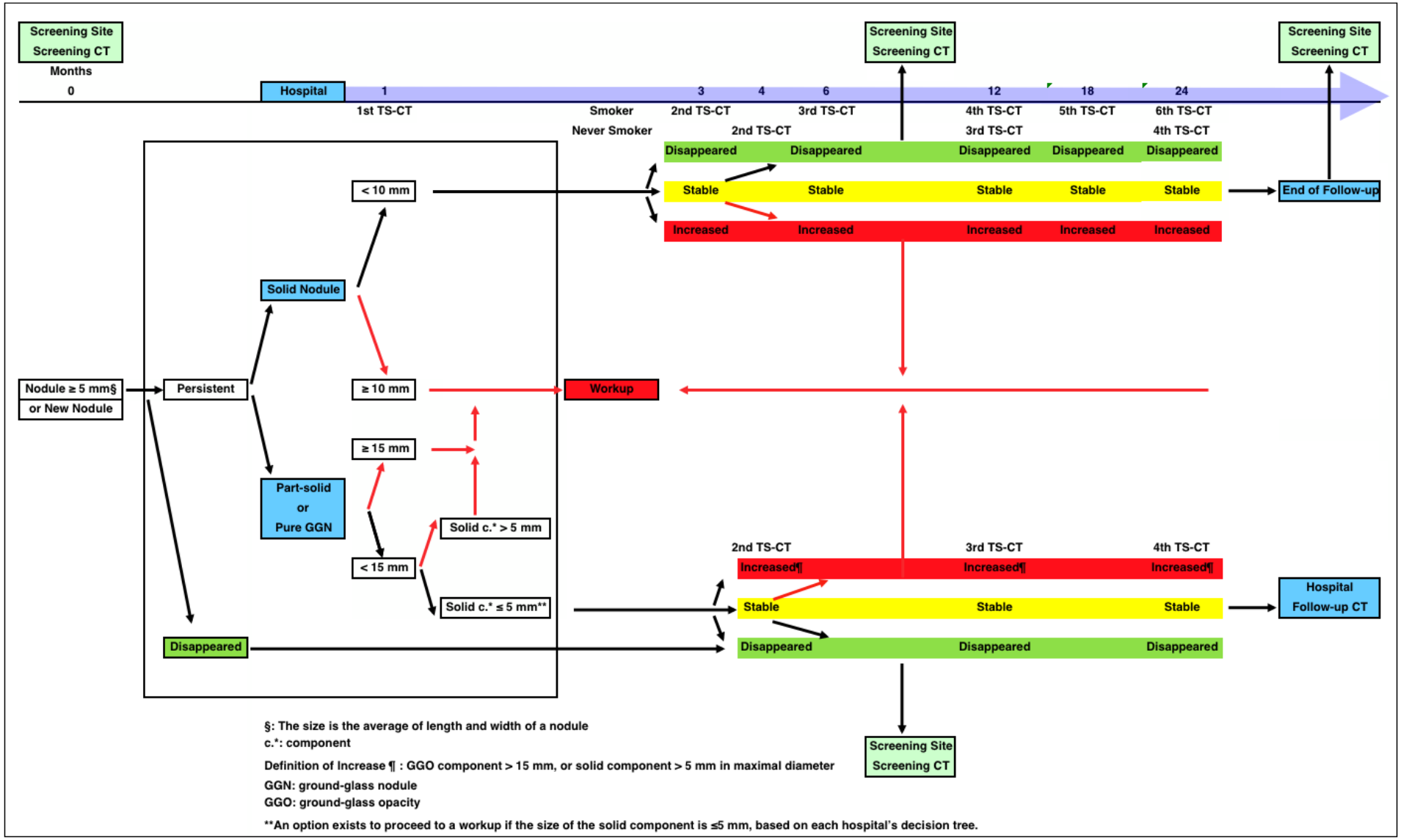
Japanese Society of CT Screening

http://www.jscts.org/

Established in 1994

- **Scientific Meeting**
- **Seminar**
  - Technologist section
  - Emphysema section
  - Nodule Management section
- **Journal (in Japanese)**

Guidelines for Pulmonary Nodule Management



§: The size is the average of length and width of a nodule
c.*: component

Definition of Increase ¶ : GGO component > 15 mm, or solid component > 5 mm in maximal diameter

GGN: ground-glass nodule
GGO: ground-glass opacity

**An option exists to proceed to a workup if the size of the solid component is ≤5 mm, based on each hospital's decision tree.

Figure 1.Guidelines for Pulmonary Nodules Management, Version 3 ©The Japanese Society of CT Screening

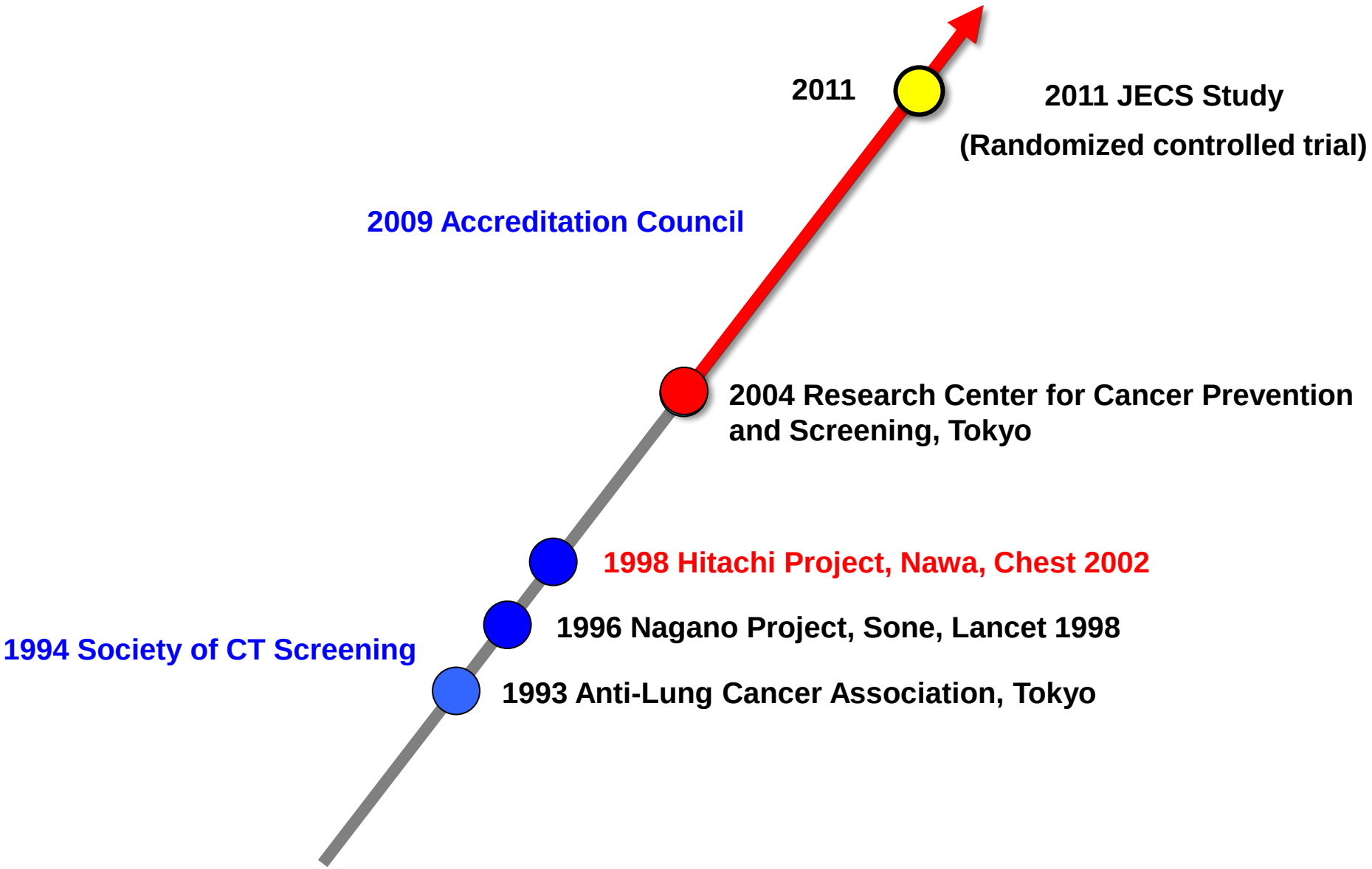
Accreditation Council for Lung Cancer CT Screening

http://www.ct-kensin-nintei.jp/

Established in 2009

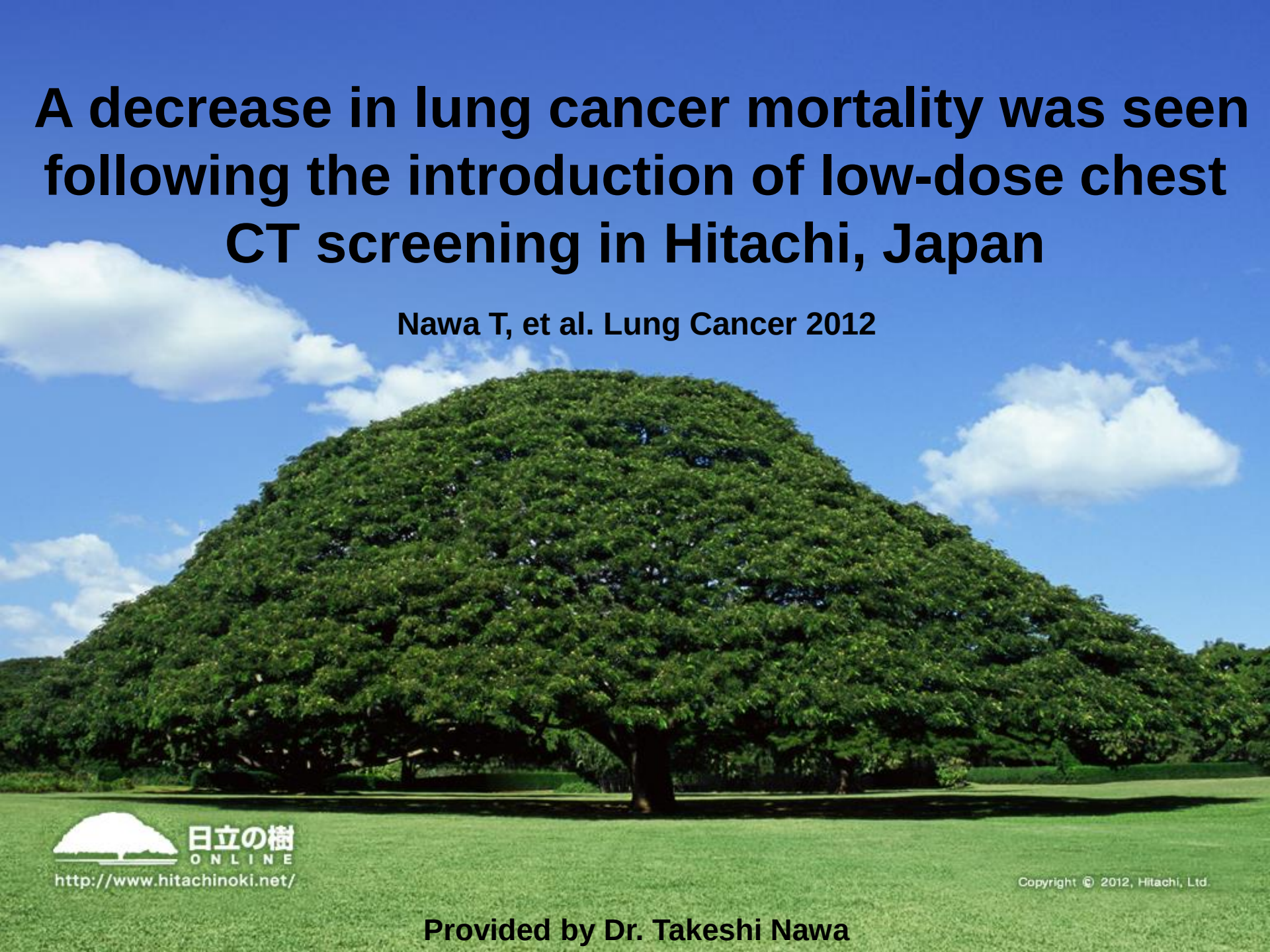
- **Accuracy Control**
- **Board-certified Doctors**
  Board-certified Technologists
- **In the near future, facilities will also be certified**

CT Lung Cancer Screening in Japan



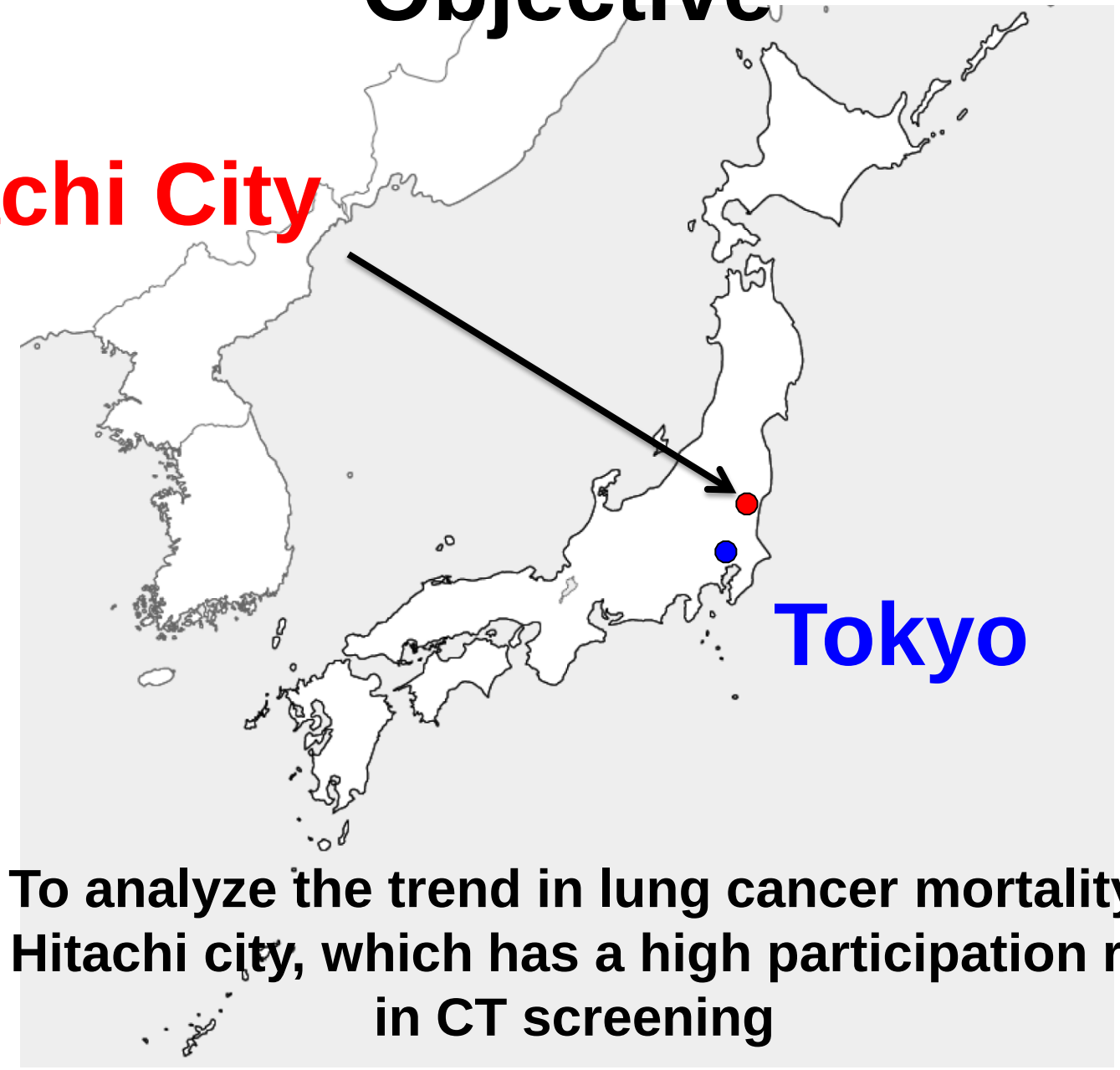
A decrease in lung cancer mortality was seen following the introduction of low-dose chest CT screening in Hitachi, Japan

Nawa T, et al. Lung Cancer 2012



Provided by Dr. Takeshi Nawa

Objective



To analyze the trend in lung cancer mortality in Hitachi city, which has a high participation rate in CT screening

Numbers of Participants According to Gender and Number of Smokers

(Between 1998 and 2009)

- **Number of participants：31,739**

  Men,18,273

  Women, 13,466

  - **Hitachi Health Care Center（1998-）**
  - **Hitachi Medical Center（2001-）**

- **40% of the population of Hitachi city (47% of men, 33% of women) screened using CT at least once as of 2009**

Provided by Dr. Takeshi Nawa

Numbers of Participants According to Gender and Number of Smokers

(Between 1998 and 2009)

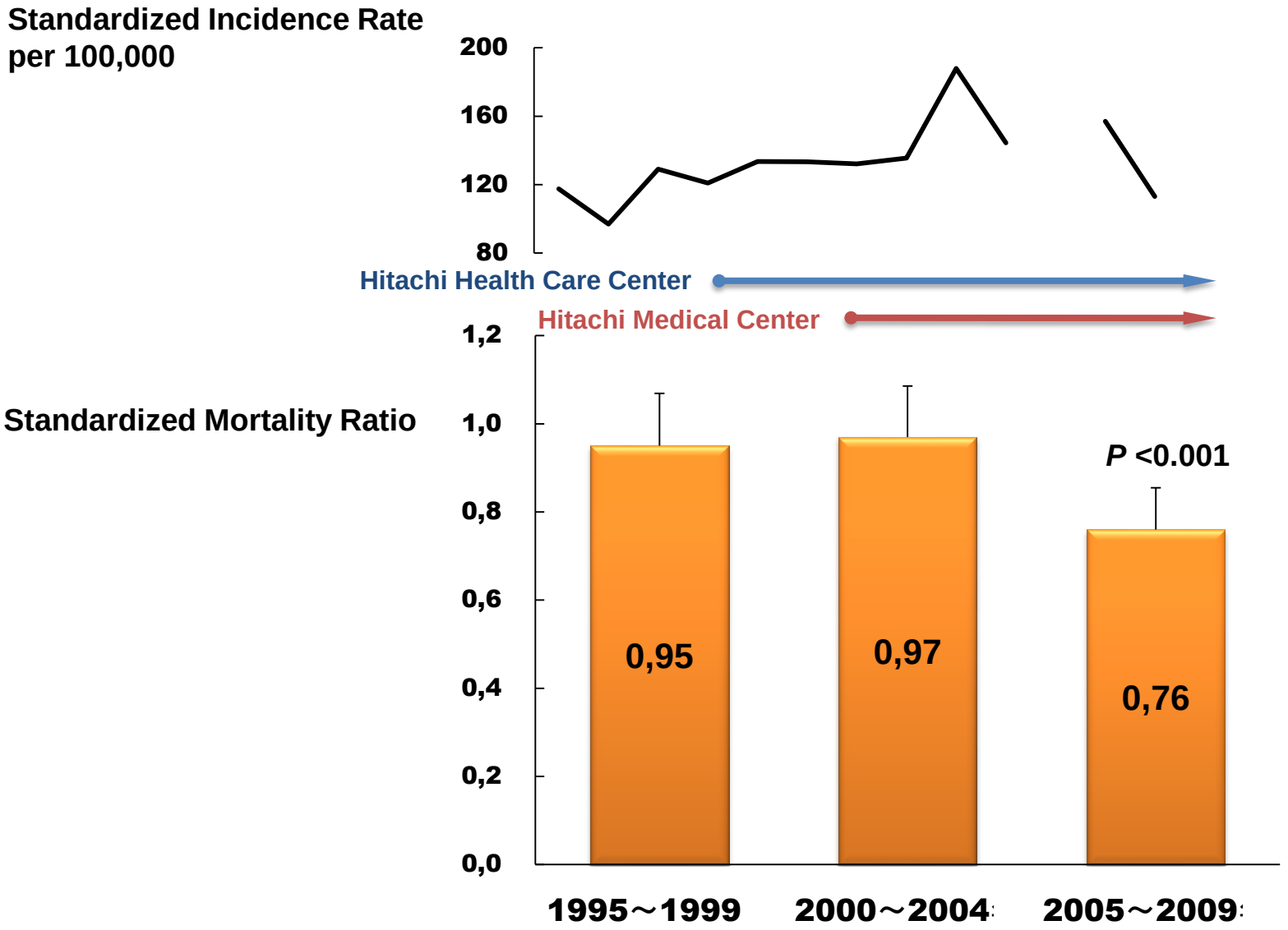
- Number of participants: 31,739 (smokers, 14,661 [46%])
  - Men,18,273 (smokers, 13,456 [74%])
  - Women, 13,466 (smokers, 1,115 [8%])

- Hitachi Health Care Center（1998-）
- Hitachi Medical Center（2001-）

- 40% of the population of Hitachi city (47% of men, 33% of women) screened using CT at least once as of 2009

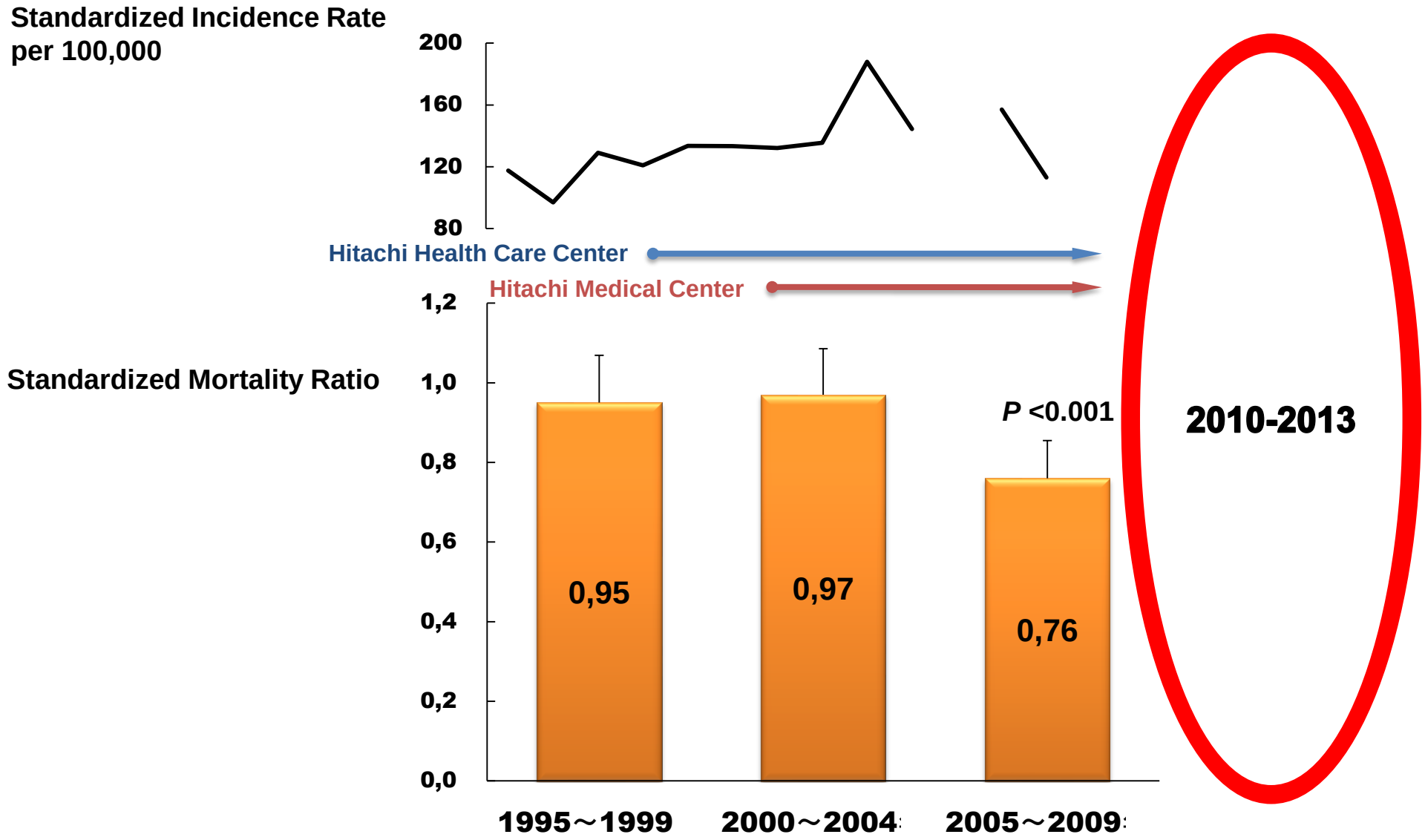
Provided by Dr. Takeshi Nawa

Time Trend of Standardized Mortality Ratio and Standardized Incidence Rate



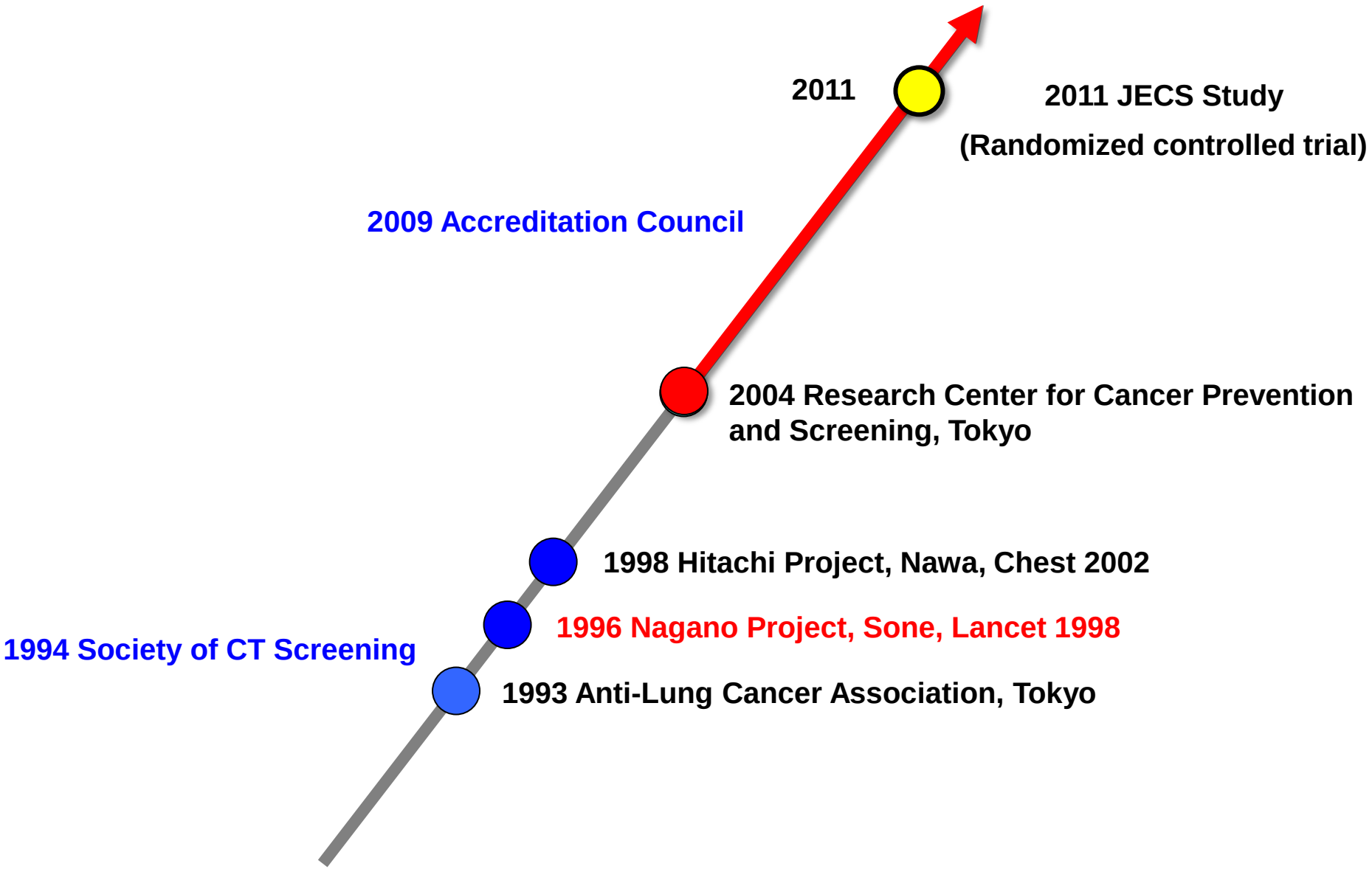
Provided by Dr. Takeshi Nawa

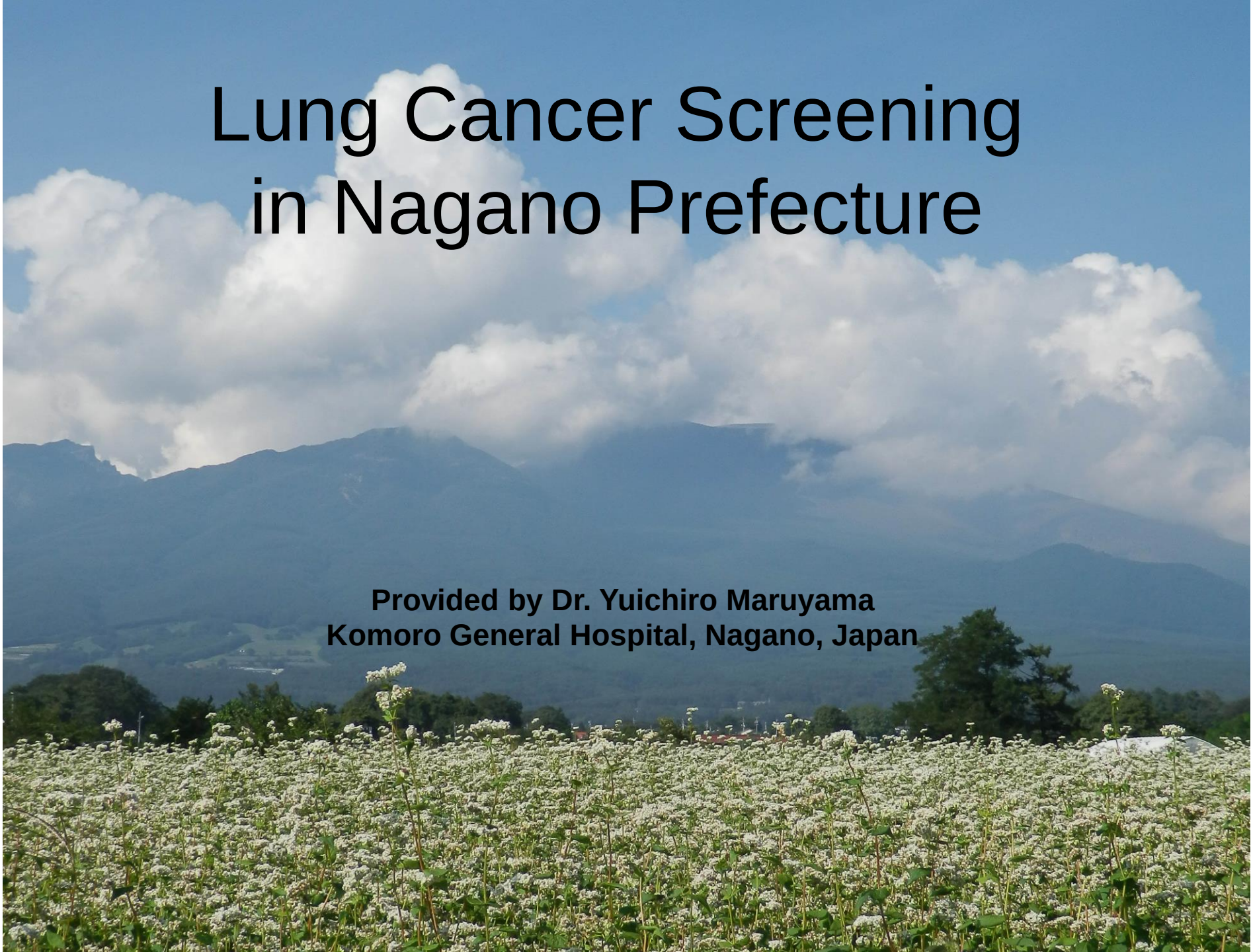
Time Trend of Standardized Mortality Ratio and Standardized Incidence Rate



Provided by Dr. Takeshi Nawa

CT Lung Cancer Screening in Japan

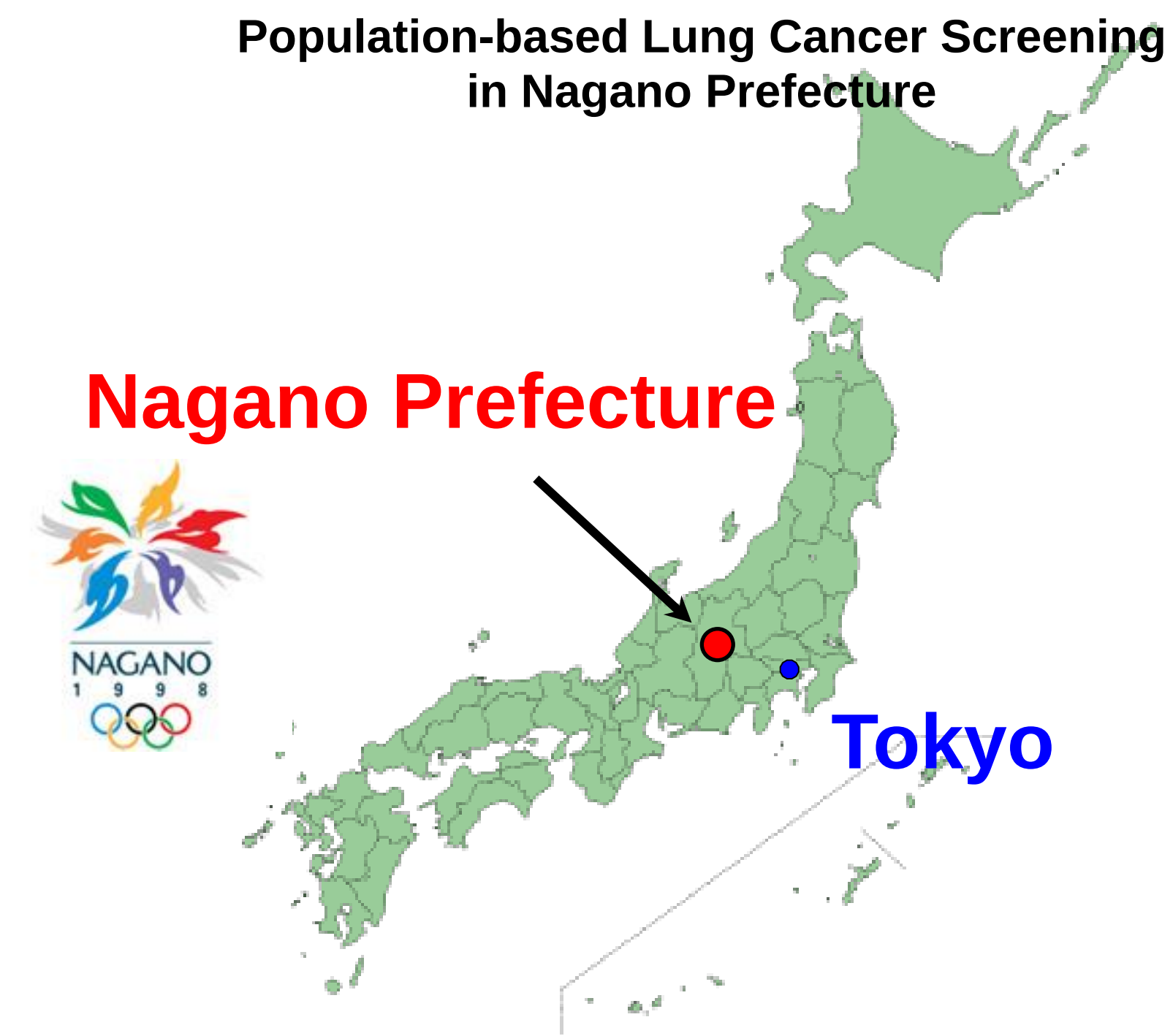




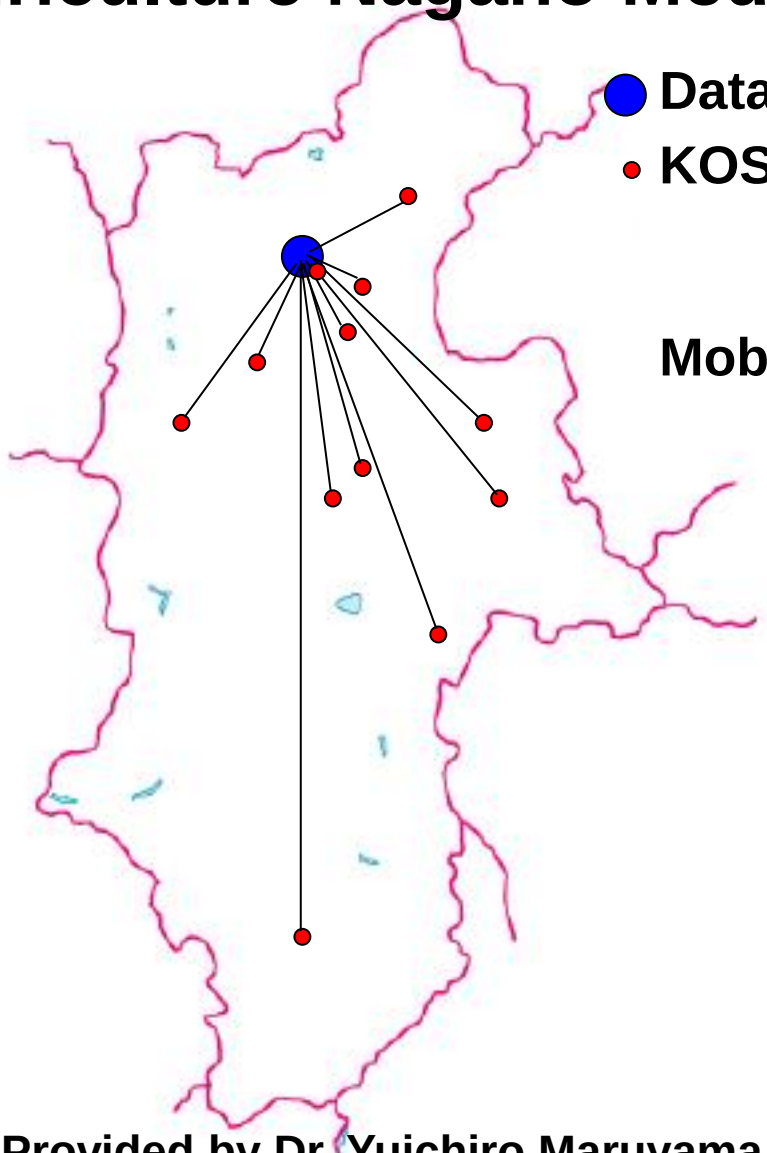
Lung Cancer Screening in Nagano Prefecture

Provided by Dr. Yuichiro Maruyama
Komoro General Hospital, Nagano, Japan

Population-based Lung Cancer Screening in Nagano Prefecture



Dedicated Optical Fiber Network for CT Lung Cancer Screening by Japan Agriculture Nagano Medical Network



Data center

KOSEI General Hospital

Mobile CT Scanner Unit

Provided by Dr. Yuichiro Maruyama

Mobile CT Unit in Nagano

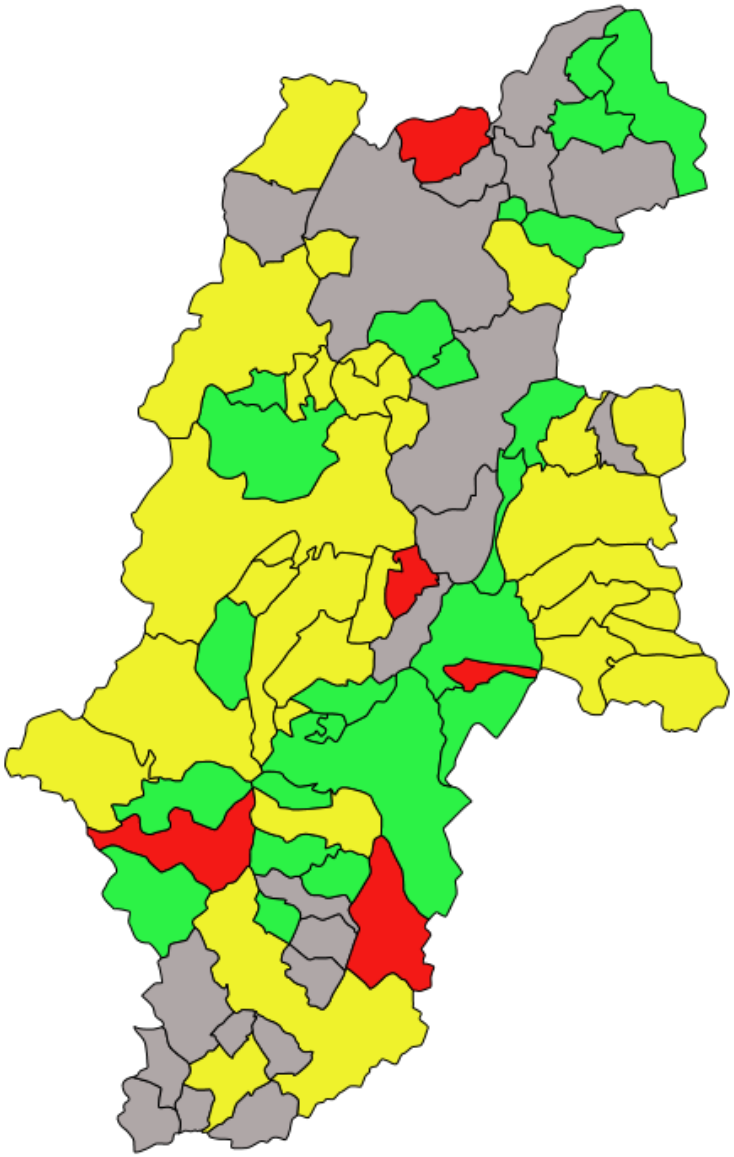
Entrance

Console

4-Multislice CT (Hitachi Ltd.), 10mA, 0.8s/rotation, 8mAs, Reconstruction Interval 5mm

Provided by Dr. Yuichiro Maruyama

Implementation Status of Lung Cancer Screening in Nagano Prefecture's 77 Municipalities



	X-ray	CT
23	×	○
30	○	○
19	○	×
5	×	×

Provided by Dr. Yuichiro Maruyama

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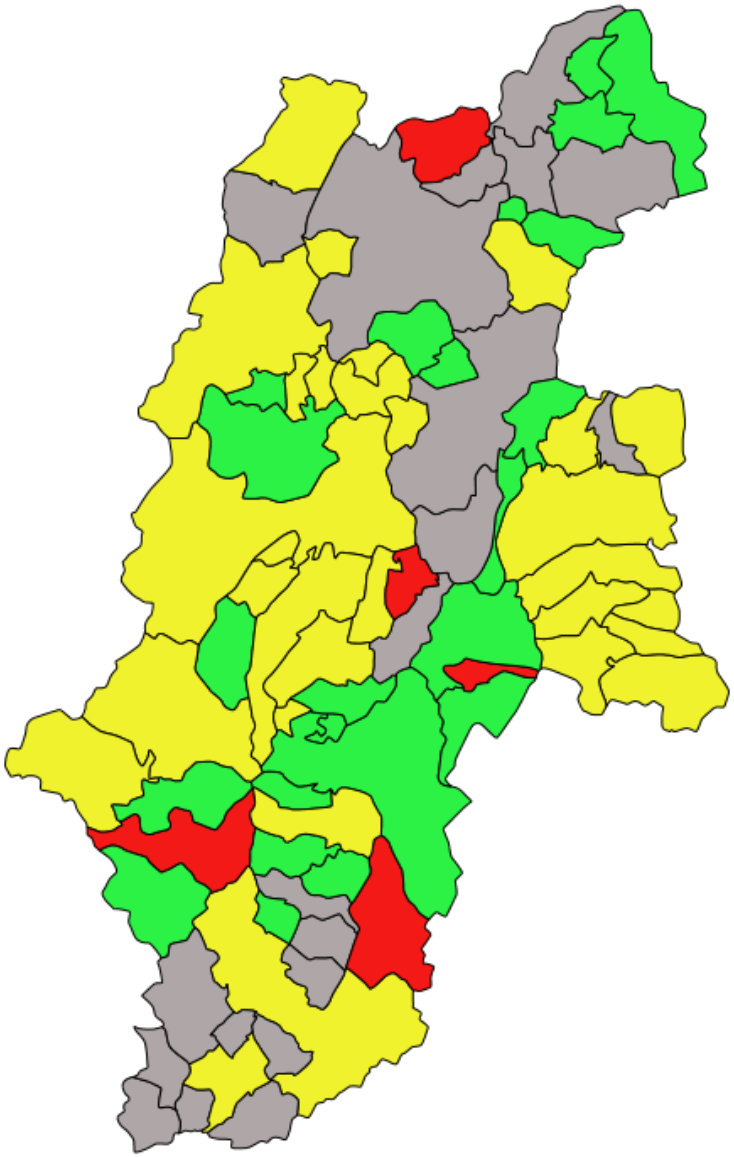

	X-ray	CT
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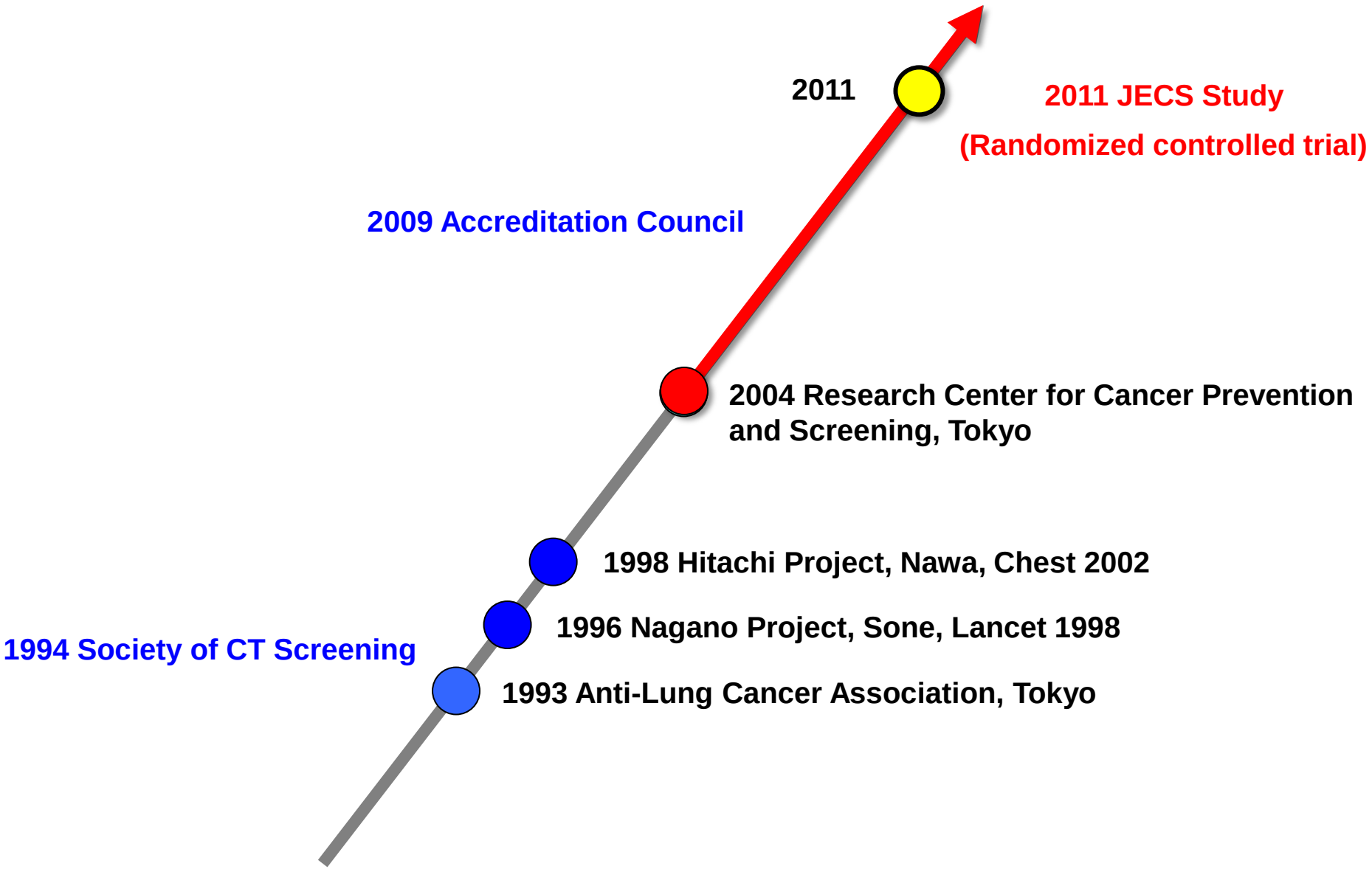

RCT to Evaluate the Efficacy of Low-dose CT Screening for Lung Cancer (Pack-years <30)

Provided by Dr. Motoyasu Sagawa

RCT to Evaluate the Efficacy of Low-dose CT Screening for Lung Cancer (Pack-years <30)

50-64 years old
35,000 participants

Provided by Dr. Motoyasu Sagawa

RCT to Evaluate the Efficacy of Low-dose CT Screening for Lung Cancer (Pack-years <30)

Assuming 60% mortality reduction

50-64 years old
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RCT to Evaluate the Efficacy of Low-dose CT Screening for Lung Cancer (Pack-years <30)

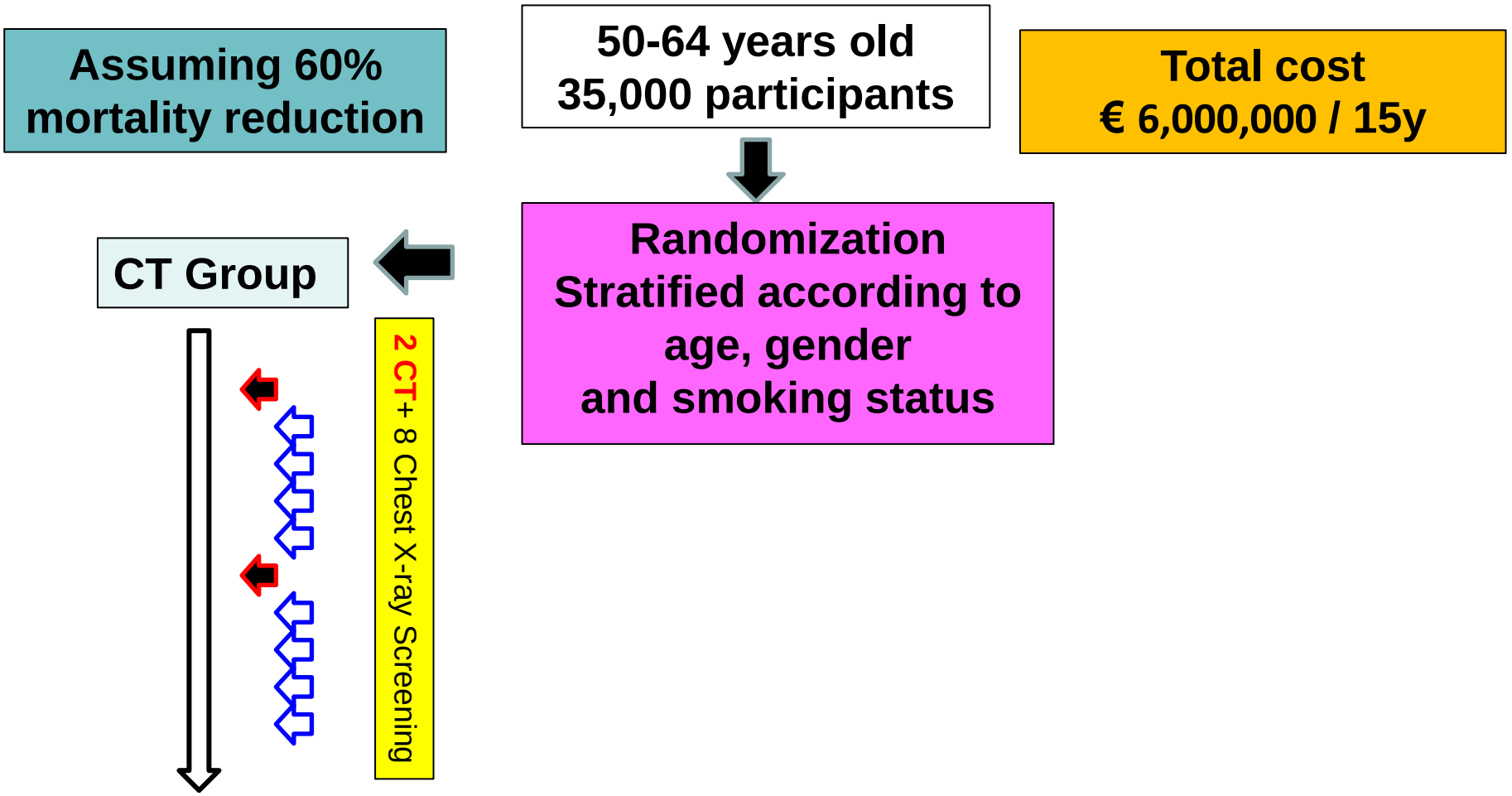
Assuming 60% mortality reduction

50-64 years old
35,000 participants

Total cost
€ 6,000,000 / 15y

Provided by Dr. Motoyasu Sagawa

RCT to Evaluate the Efficacy of Low-dose CT Screening for Lung Cancer (Pack-years <30)



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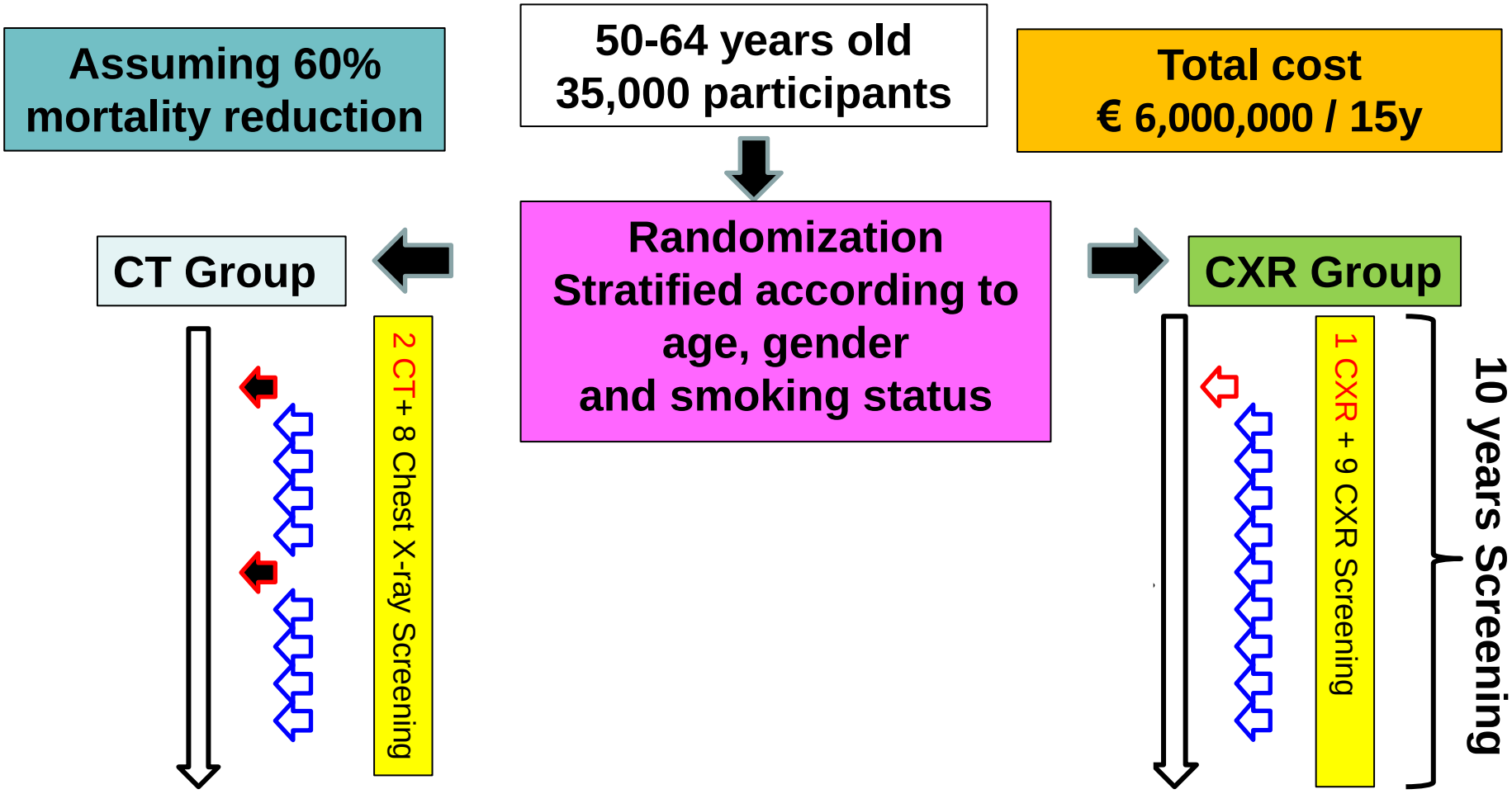

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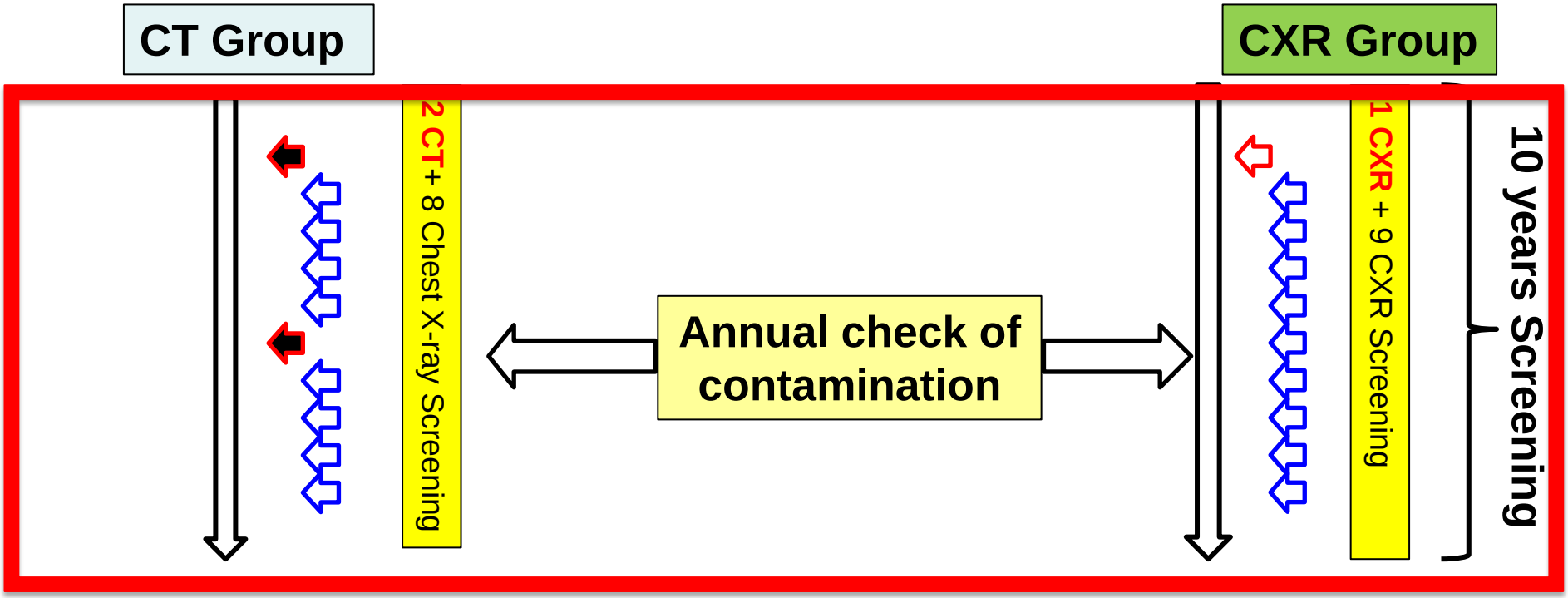

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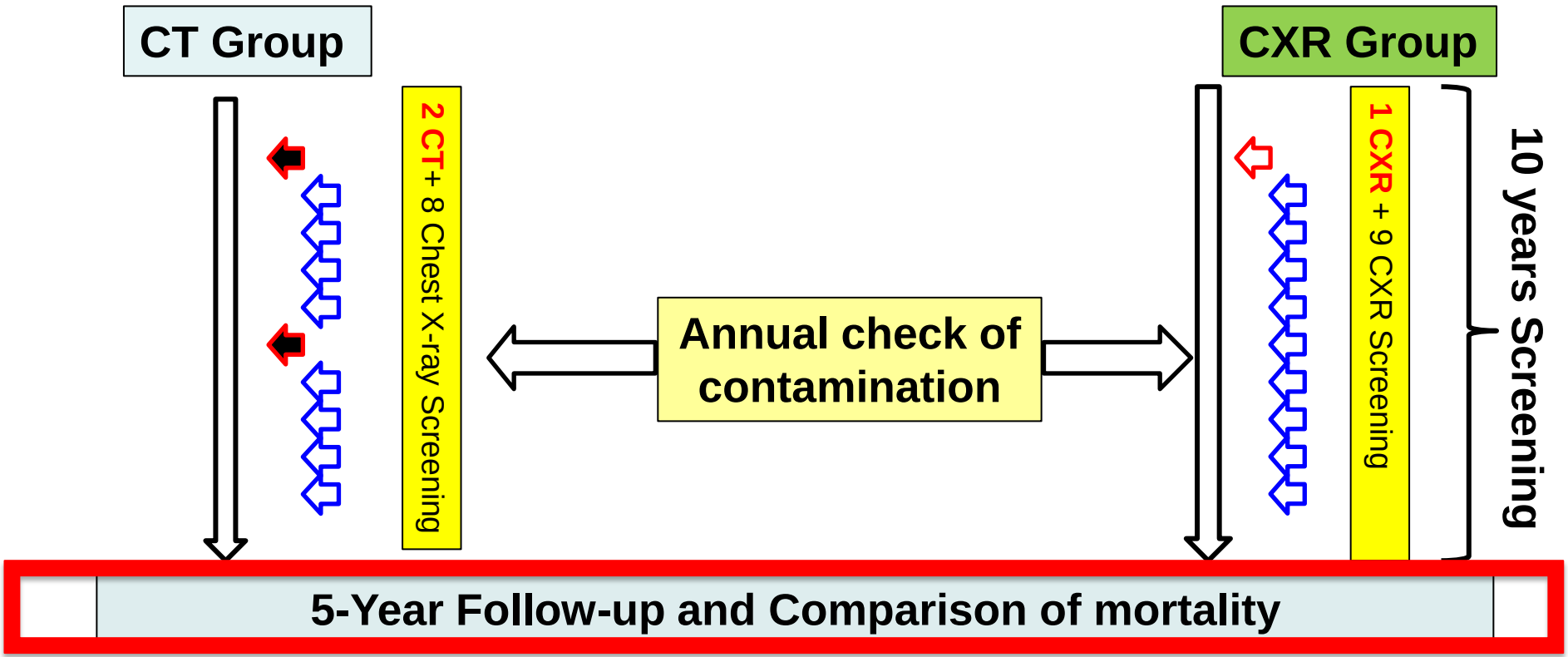
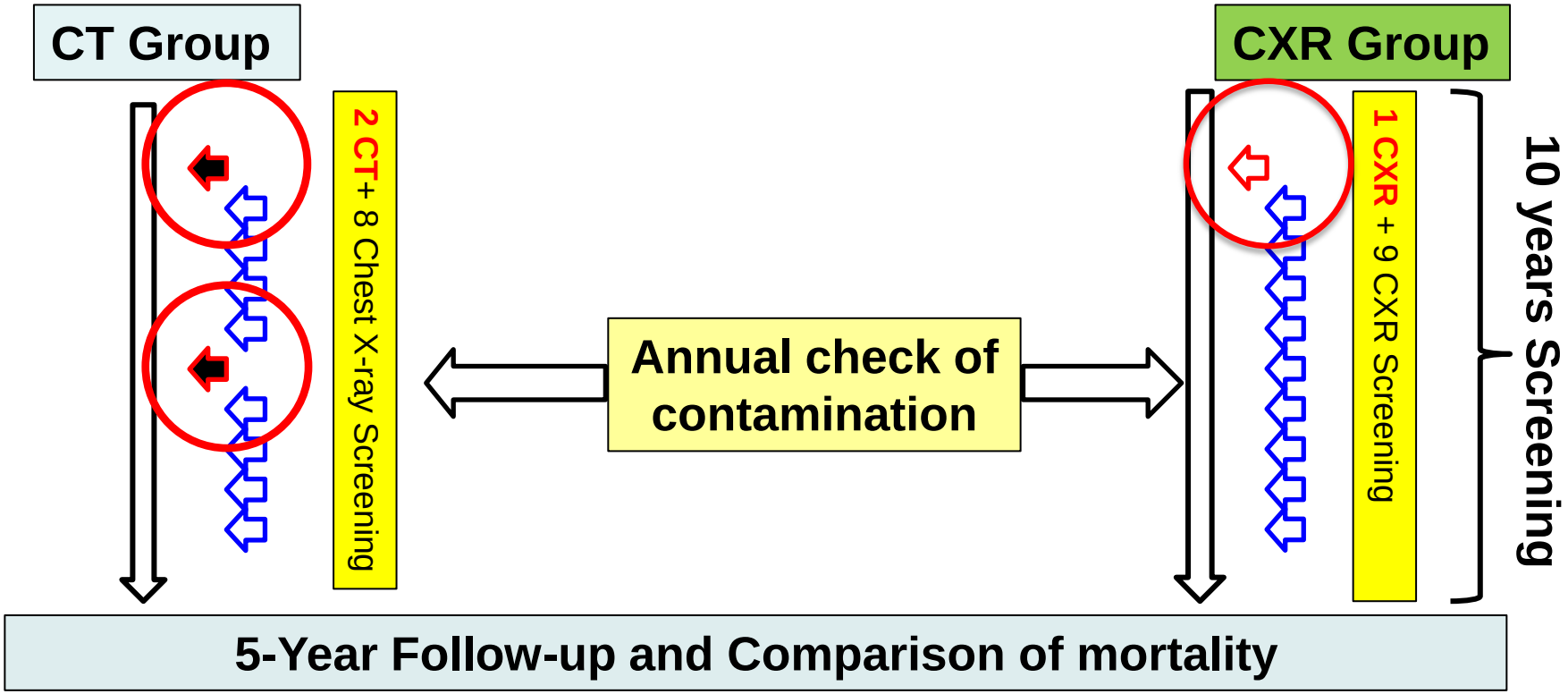
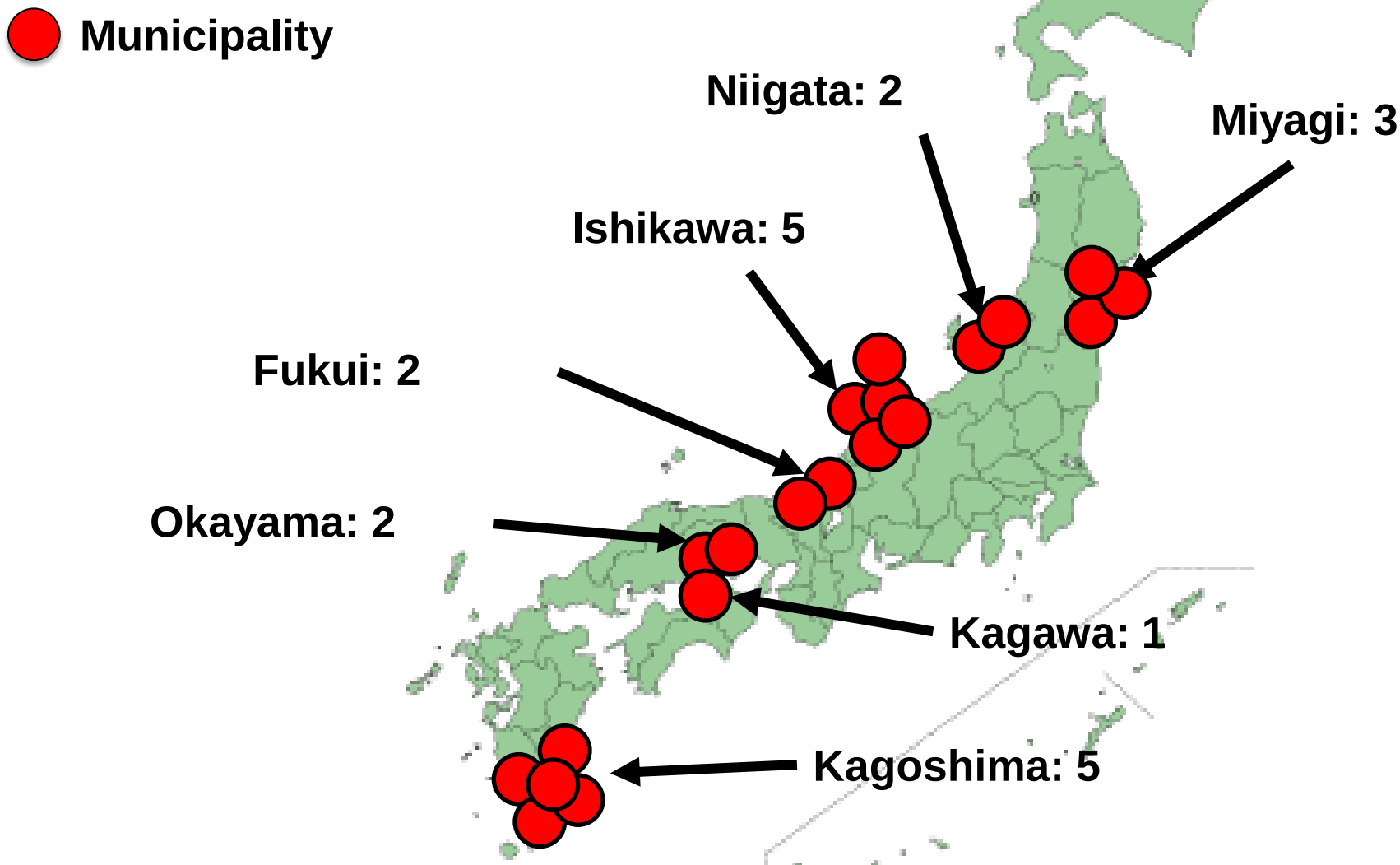


RCT to Evaluate the Efficacy of Low-dose CT Screening for Lung Cancer (Pack-years <30)



The Japanese Randomized Trial for Evaluating the Efficacy of Low-dose Thoracic CT Screening for Lung Cancer

JECS Study in 20 Municipalities



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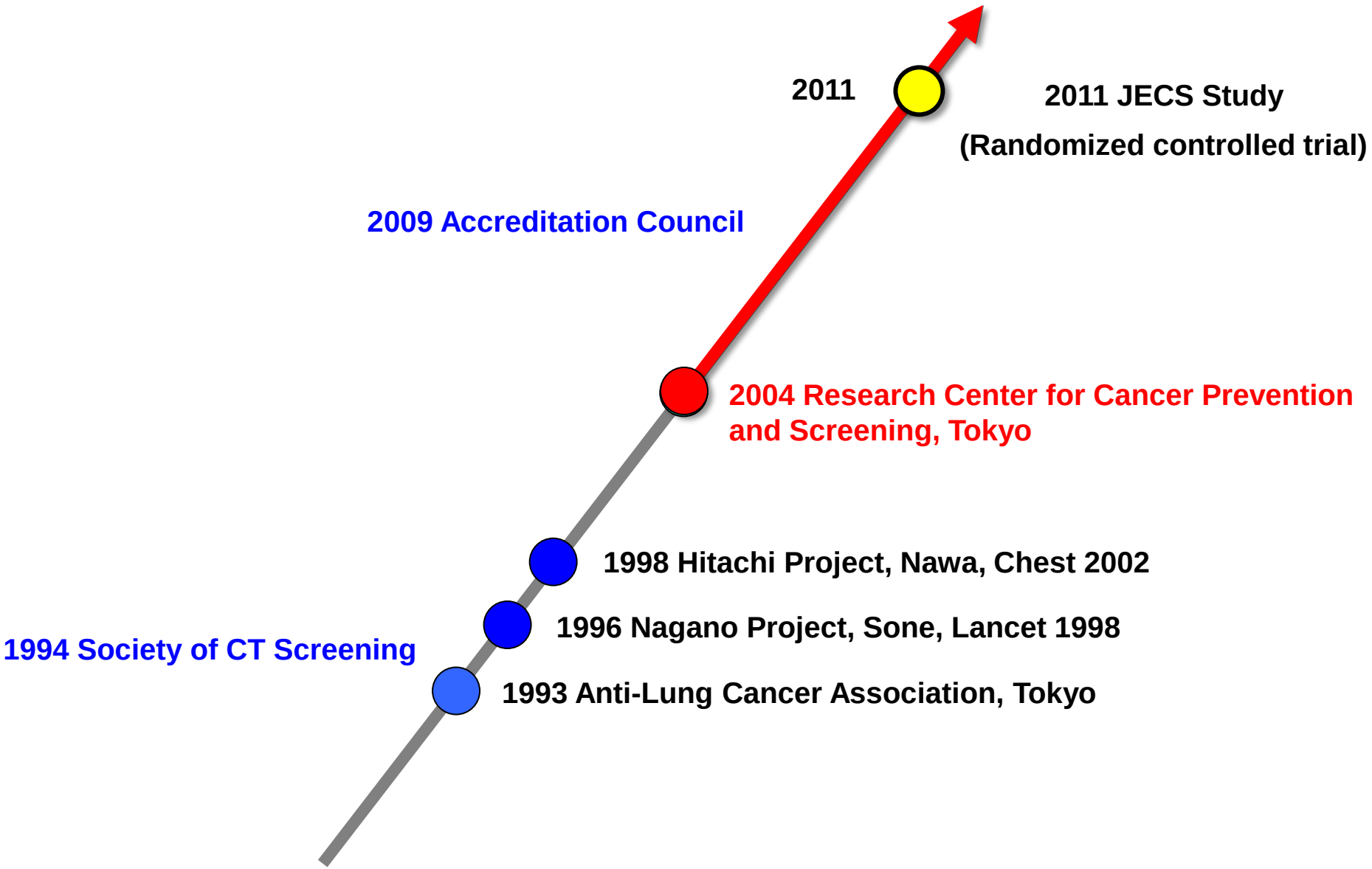
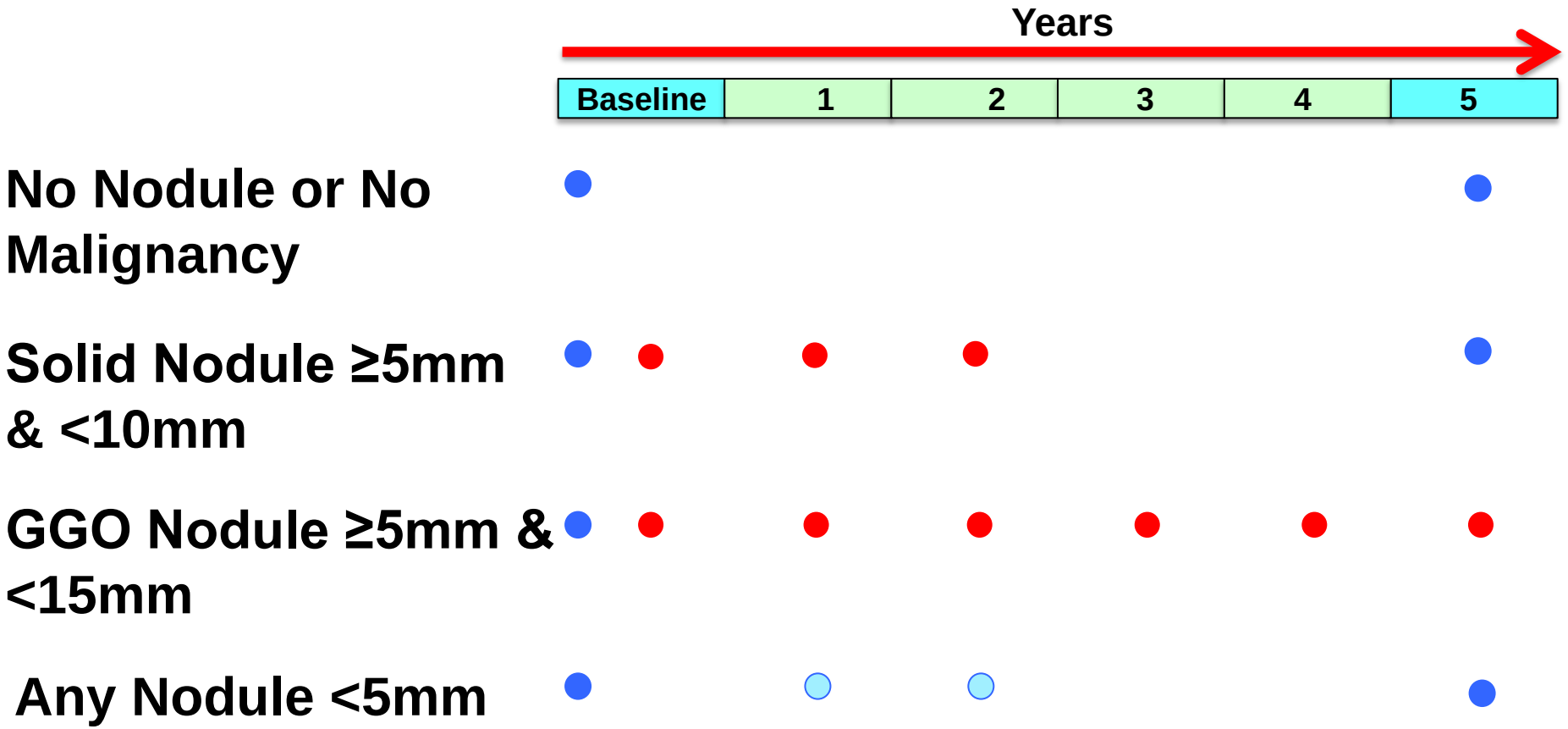
CT Lung Cancer Screening in Japan

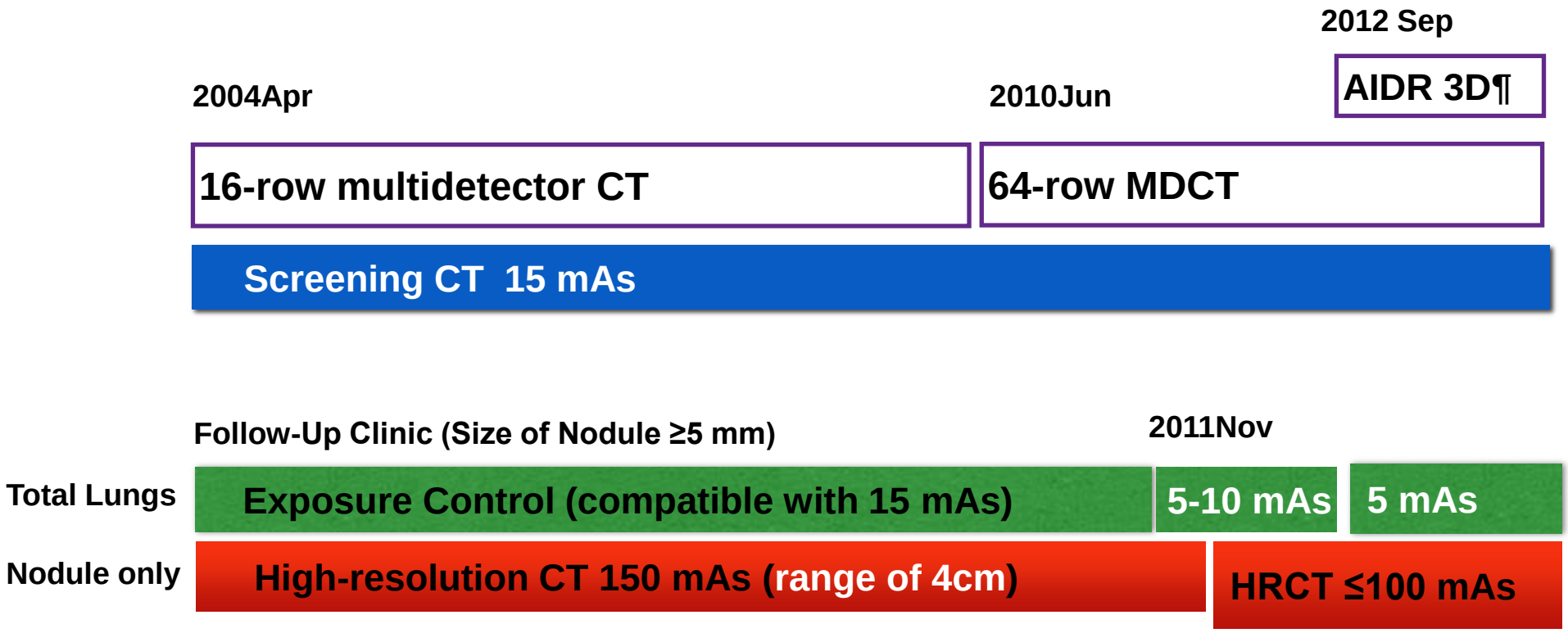


Research Center for Cancer Prevention and Screening

Screening CT and Follow-Up CT Protocol In RCCPS

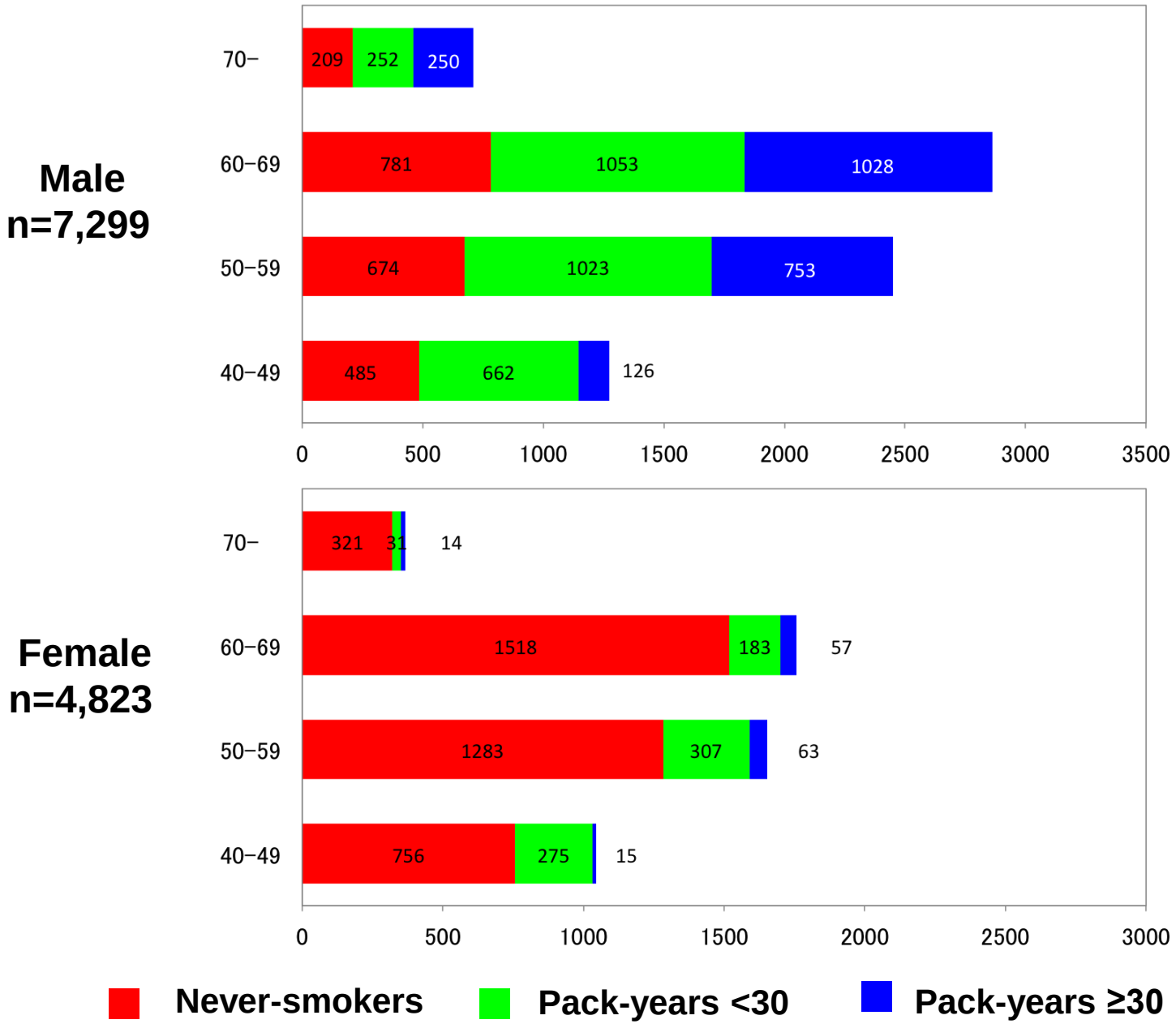


Protocols of CT Scan



¶ Adaptive Iterative Dose Reduction 3D

Participants According to Gender, Ager and Smoking Status Between 2004 and March 2012 (N=12122)



Lung Cancers According to Gender, Diameter, Histology and Smoking Status

		Never-Smoker	Pack-years <30	Pack-years ≥30	Total
Cases /Lesions §					132/147
	Male	16/16	22/22	32/36	70/74
	Female	50/59	10/12	2/2	62/73
Maximal Diameter (cm)*		1.5 ± 0.7	1.4 ± 0.7	1.5 ± 0.6	1.5 ± 0.7
Histology	Adeno	73 (97%)	31 (91%)	28 (74%)	132
	Sq	0	0	8	8
	Small	0	1	2	3
	Adsq	0	1	0	1
	Carcinoid	2	0	0	2
	NSCLC	0	1	0	1

*Mean ± SD

Lesions § : nodules + other lesions

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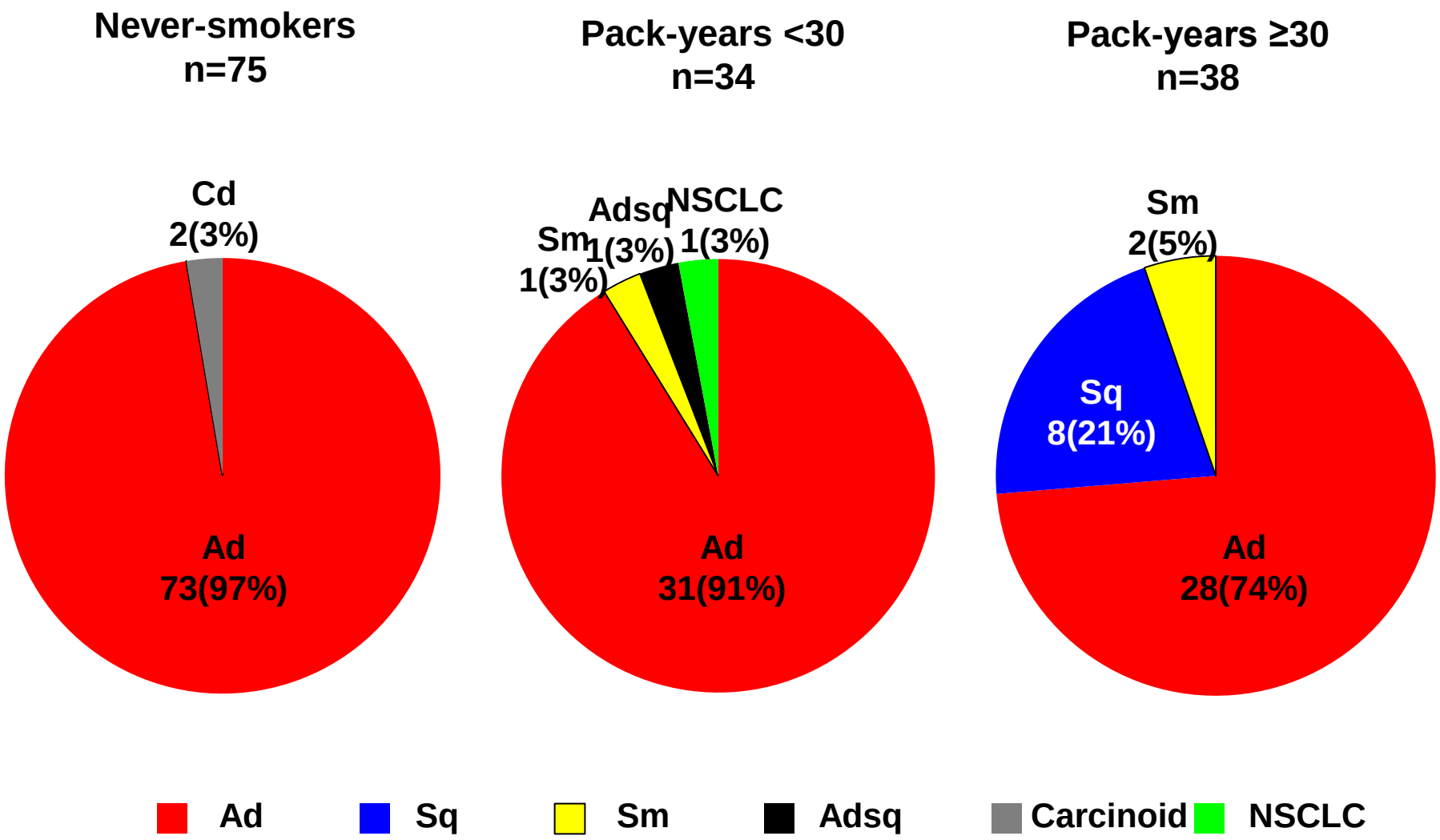
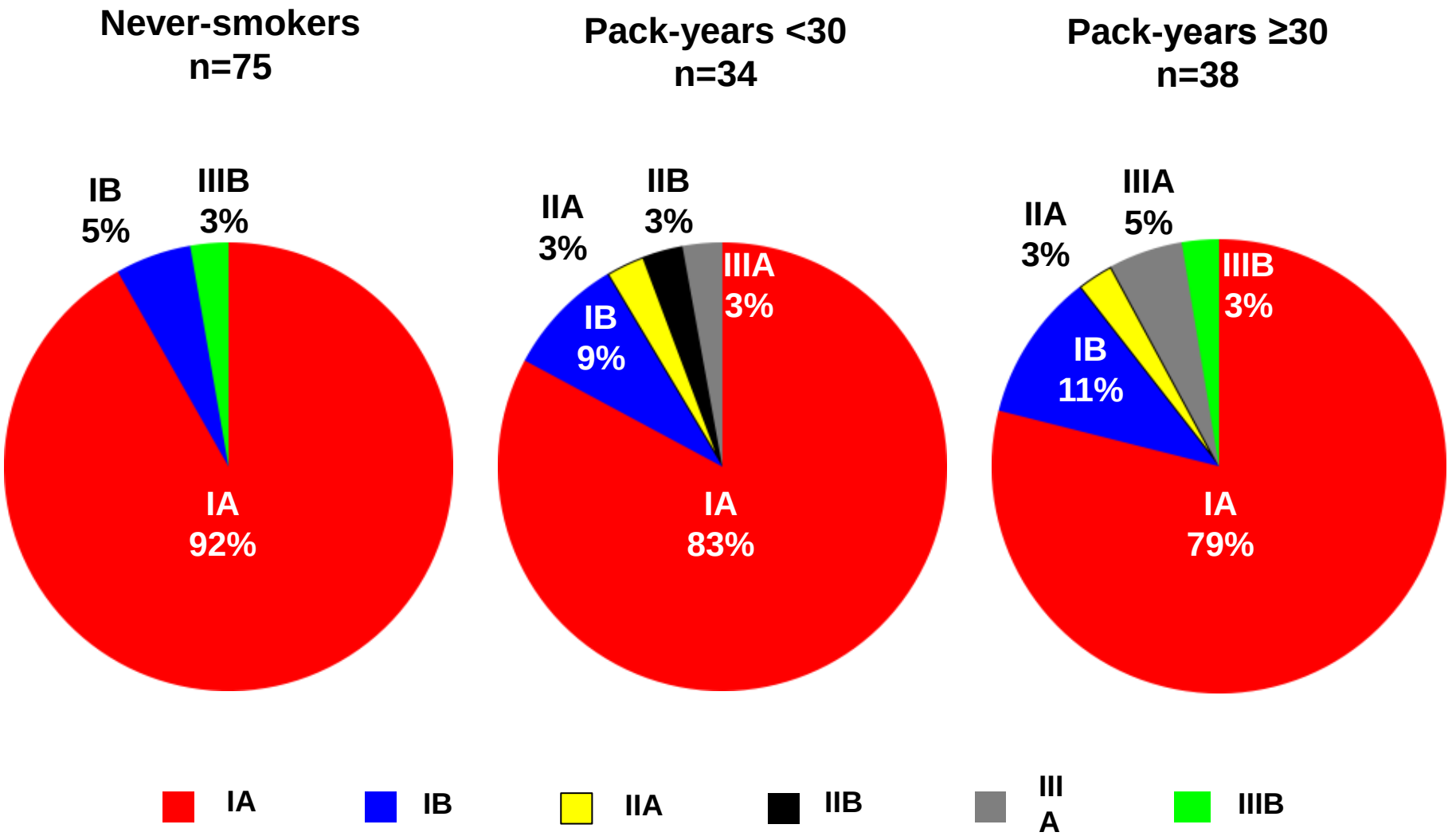
Lung Cancers According to Histology and Smoking Status



Lung Cancers According to Stages and Smoking Status



Lung Cancer Cases According to Gender and Smoking Status

***P* < 0.0001**

	Never-smokers	Smokers*	Total
Men	**16**	**54**	**70**
Women	**50**	**12**	**62**
Total	**66**	**66**	**132**

*** Smokers: including ex-smokers**

Lung Cancer Cases According to Gender and Smoking Status

***P* < 0.0001**

	Never-smokers	Smokers*	Total
Men	16	54	70
Women	50	12	62
Total	66	66	132

*** Smokers: including ex-smokers**

Adenocarcinoma Cases According to Smoking Status and Histopathology

***P* = 0.274**

	AIS+MIA	Invasive	Total
Never-smokers	42	23	65
Smokers*	29	24	53
Total	71	47	118

Smokers: including ex-smokers
AIS: adenocarcinoma in situ
MIA: minimally invasive adenocarcinoma
Invasive: invasive adenocarcinoma

Adenocarcinoma Cases According to Smoking Status and Histopathology

***P* = 0.274**

	AIS+MIA	Invasive	Total
Never-smokers	42	23	65
Smokers*	29	24	53
Total	71	47	118

Smokers: including ex-smokers
AIS: adenocarcinoma in situ
MIA: minimally invasive adenocarcinoma
Invasive: invasive adenocarcinoma

Never-smoker Adenocarcinoma Cases According to Gender and Histopathology

***P* <0.05**

	AIS+MIA	Invasive	Total
Men	7	9	16
Women	35	14	49
Total	42	23	65

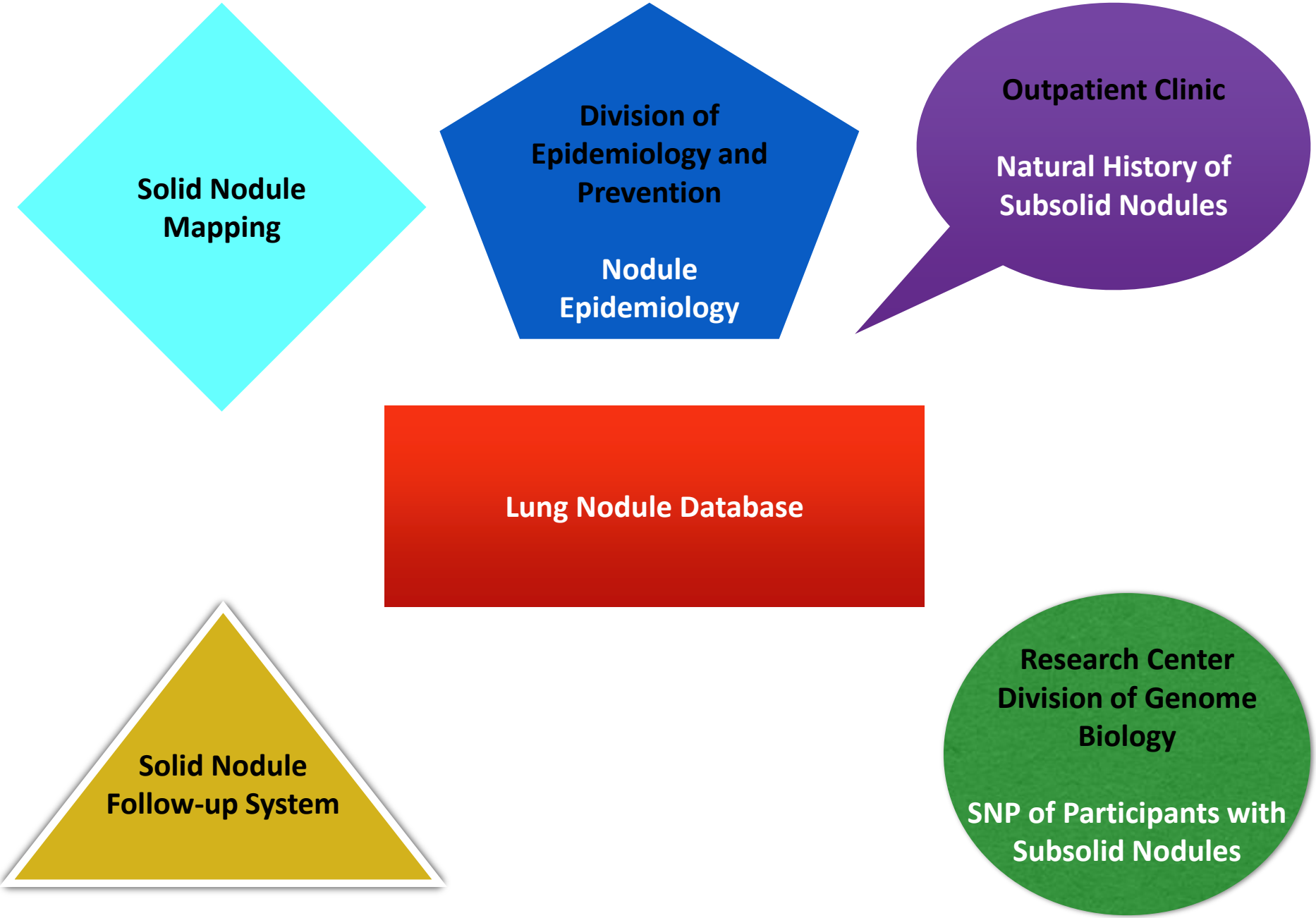
Smokers: including ex-smokers
AIS: adenocarcinoma in situ
MIA: minimally invasive adenocarcinoma
Invasive: invasive adenocarcinoma

Never-smoker Adenocarcinoma Cases According to Gender and Histopathology

***P* <0.05**

	AIS+MIA	Invasive	Total
Men	7	9	16
Women	35	14	49
Total	42	23	65

Smokers: including ex-smokers
AIS: adenocarcinoma in situ
MIA: minimally invasive adenocarcinoma
Invasive: invasive adenocarcinoma


Solid Nodule Mapping
Division of Epidemiology and Prevention
Nodule Epidemiology
Outpatient Clinic
Natural History of Subsolid Nodules
Lung Nodule Database
Solid Nodule Follow-up System
Research Center Division of Genome Biology
SNP of Participants with Subsolid Nodules