Lung Cancer Epidemiology / Tobacco Control

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Lung cancer **decrease** expected from:

- Reduction of $PM_{2.5}$ in ambient air (outdoor and indoor)
- Ban of asbestos, $ClCH_2$-O-CH_2Cl, COCl2, and other occupational carcinogens
- ↓ As, Be, Cd, Cr^{VI}, Ni, SiO_2, soot, Rn and other environmental & occup. carcinogens

Lung cancer **increase** expected from:

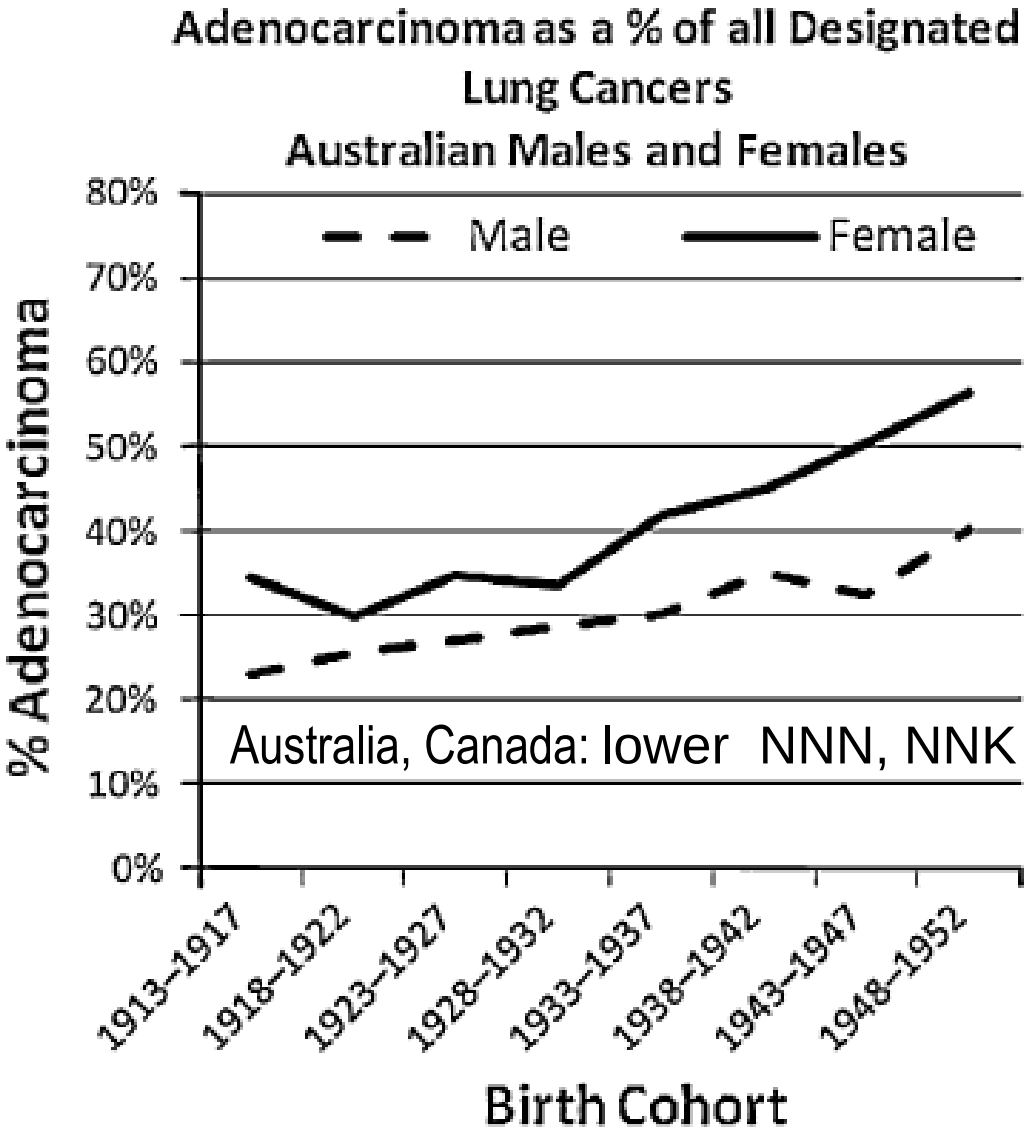
- Tobacco marketing, affordability
- Gateways to nicotine addiction (shisha, e-cigarettes, etc.)
- Earlier start of regular smoking (additives, advertisement, deregulation)
- Undermining of cessation (alternatives: reduction, dual use)

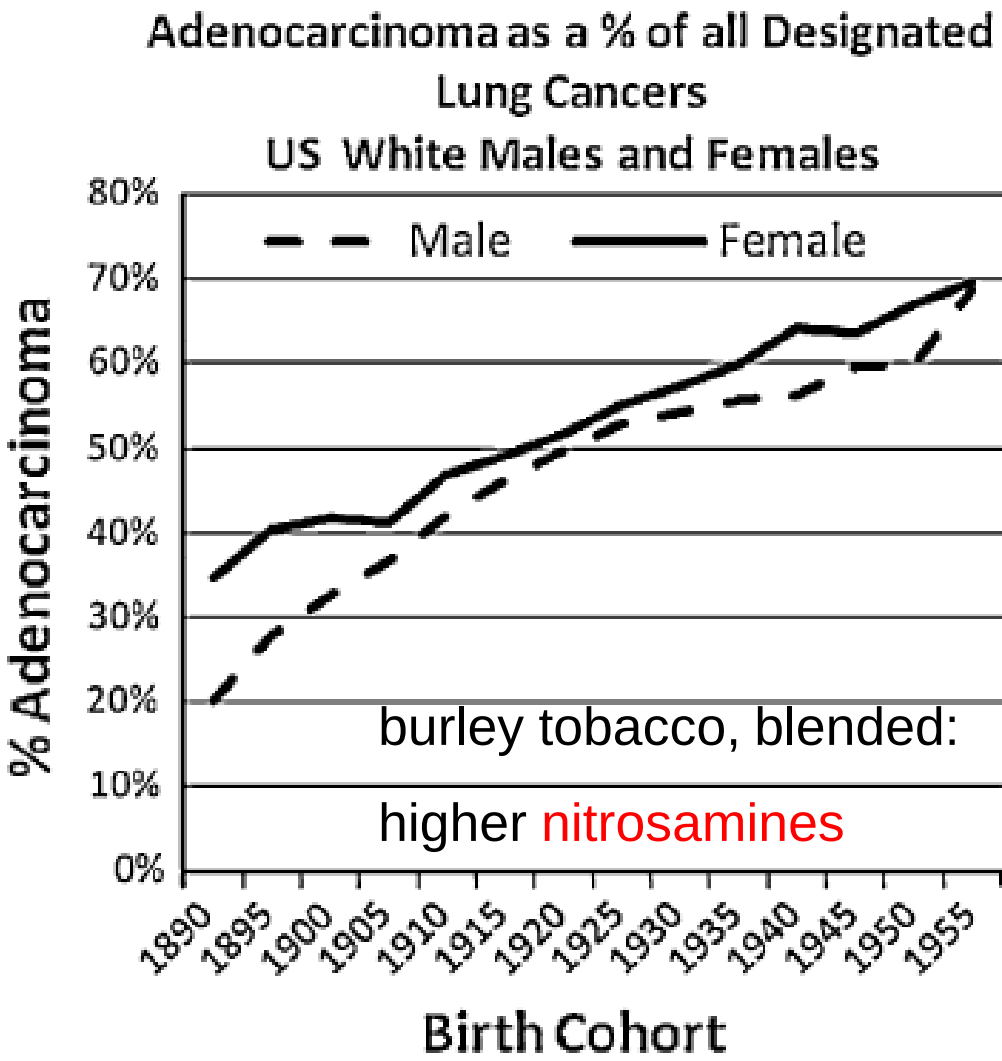
Worldwide increase of bronchial adenocarcinoma

Deeper inhalation of low tar cigarettes with ventilated filters, menthol, etc, alveolar deposition

PAHs adsorbed on larger surface of **smaller particles** (sidestream smoke)

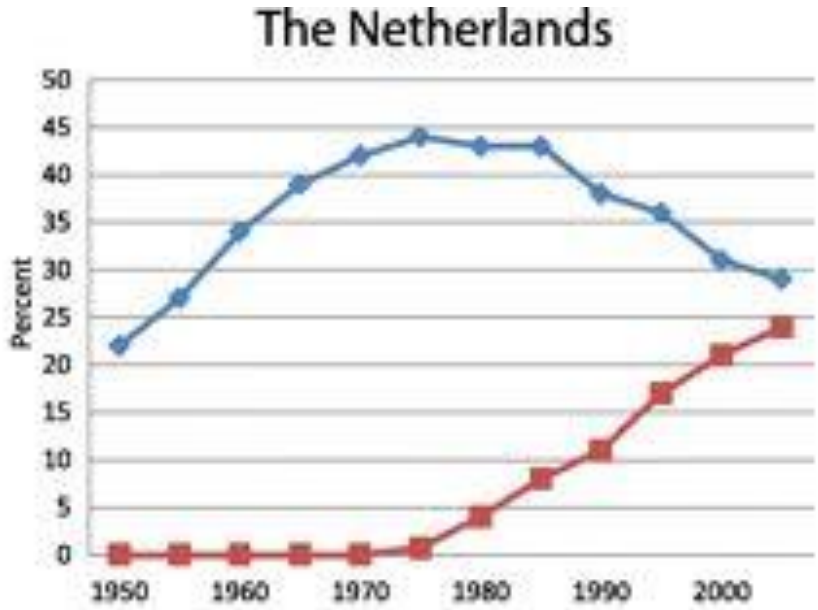
(BaP potency equivalency factors underestimate cancer risk)

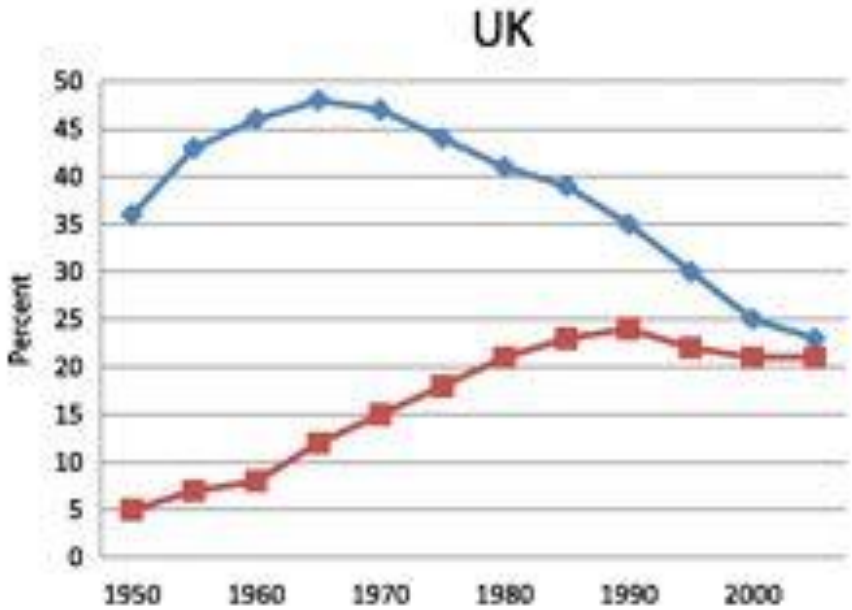


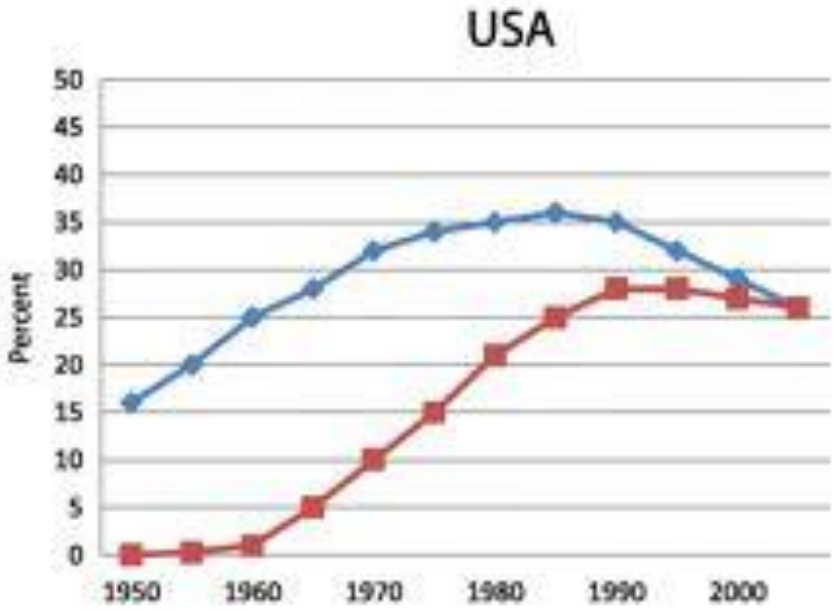


Burns et al. 2010: Cancer Causes Control

Smoking-attributed deaths estimated from lung cancer rates, expressed as a percentage of all deaths (Thun et al. 2012. Tob Control 21:96)







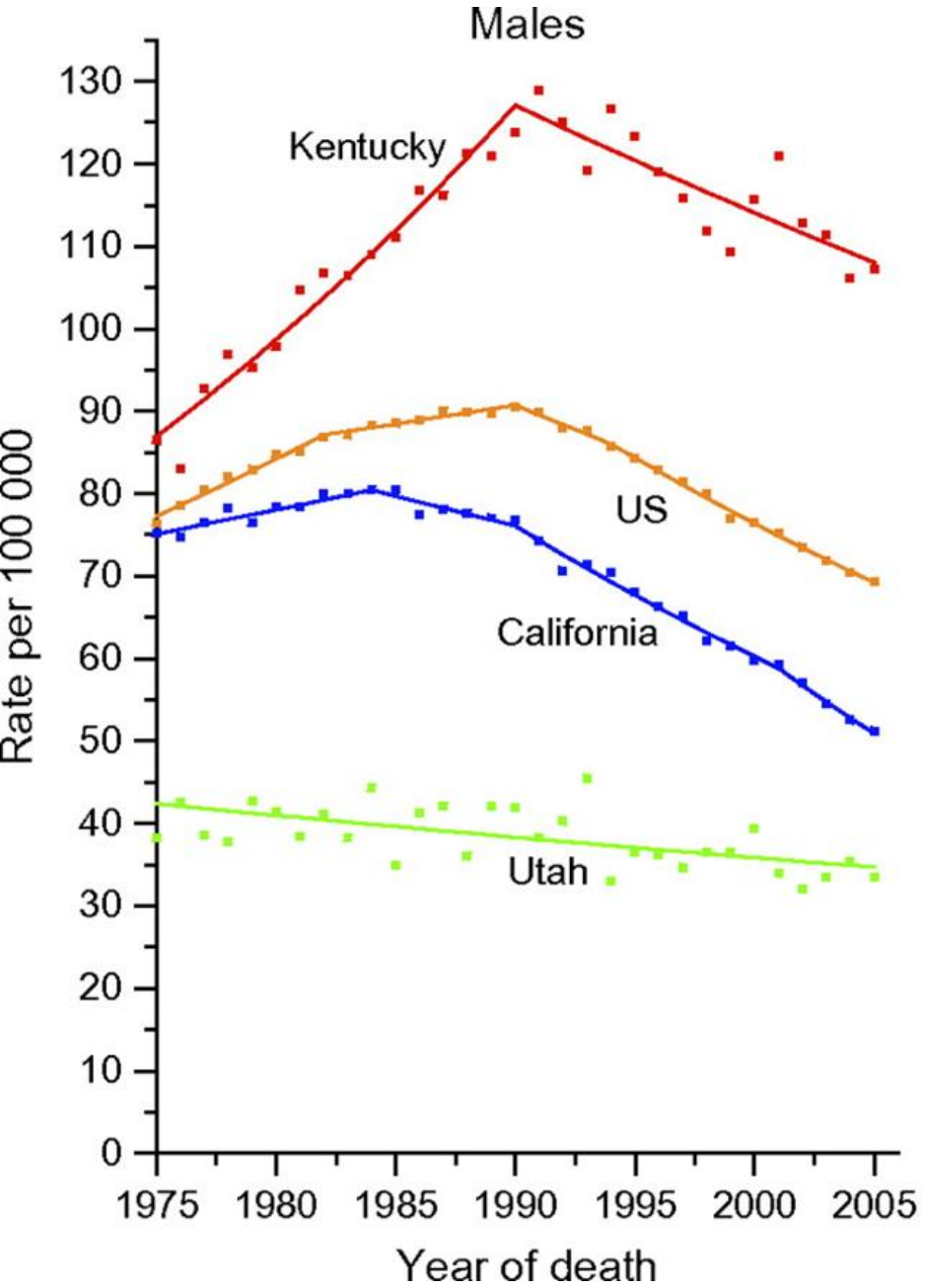
	%smokers
Utah	10
Calif.	12
N. Y.	14
Sweden	15
Iceland	15
Brazil	15
Australia	16
N.Z.	16
Norway	17
U.K.	19

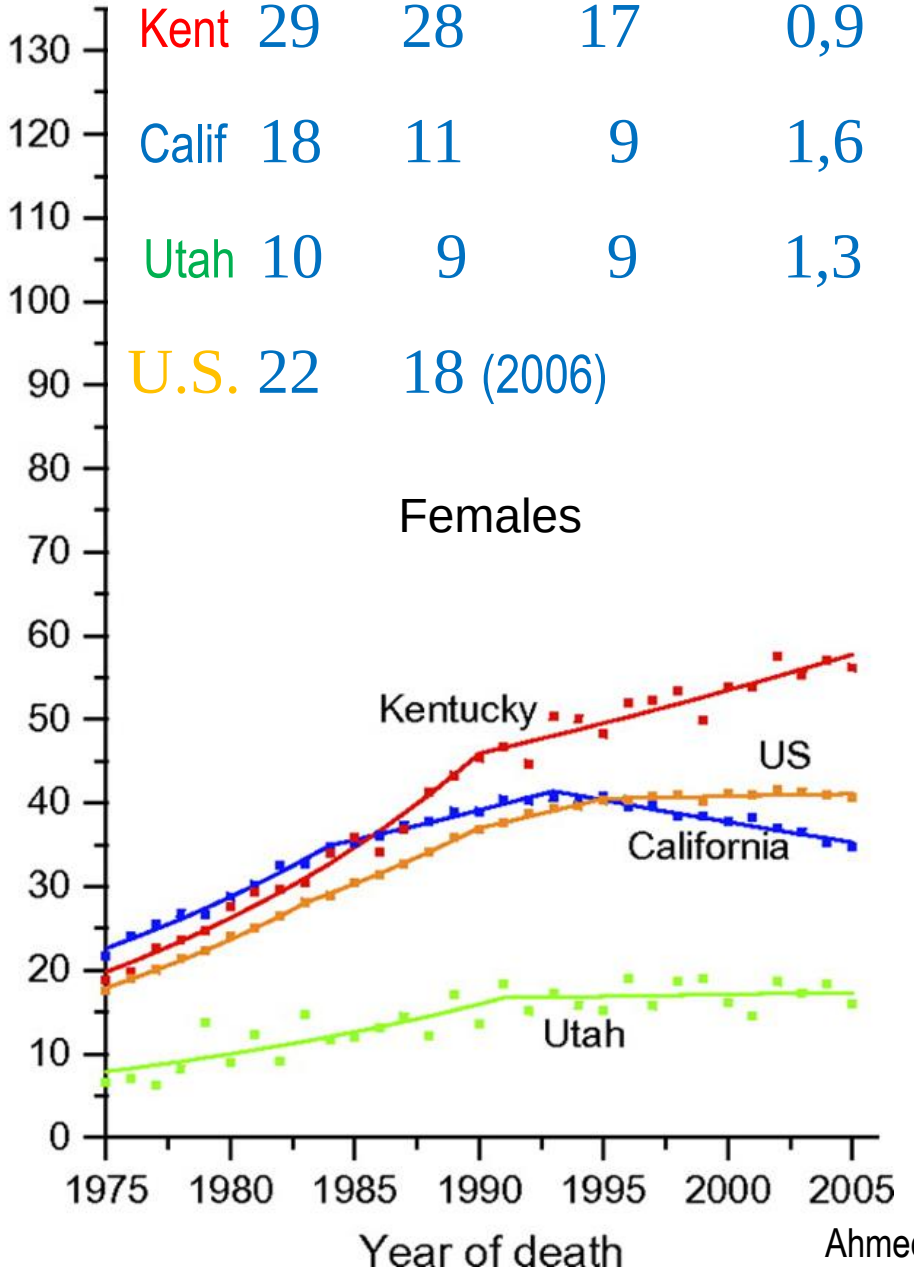
German males: 61% of cancer mortality

Borsoi et al. Wien Klin Wochenschr 122: 698–703

Lung cancer mortality in U.S. (age-standardized)

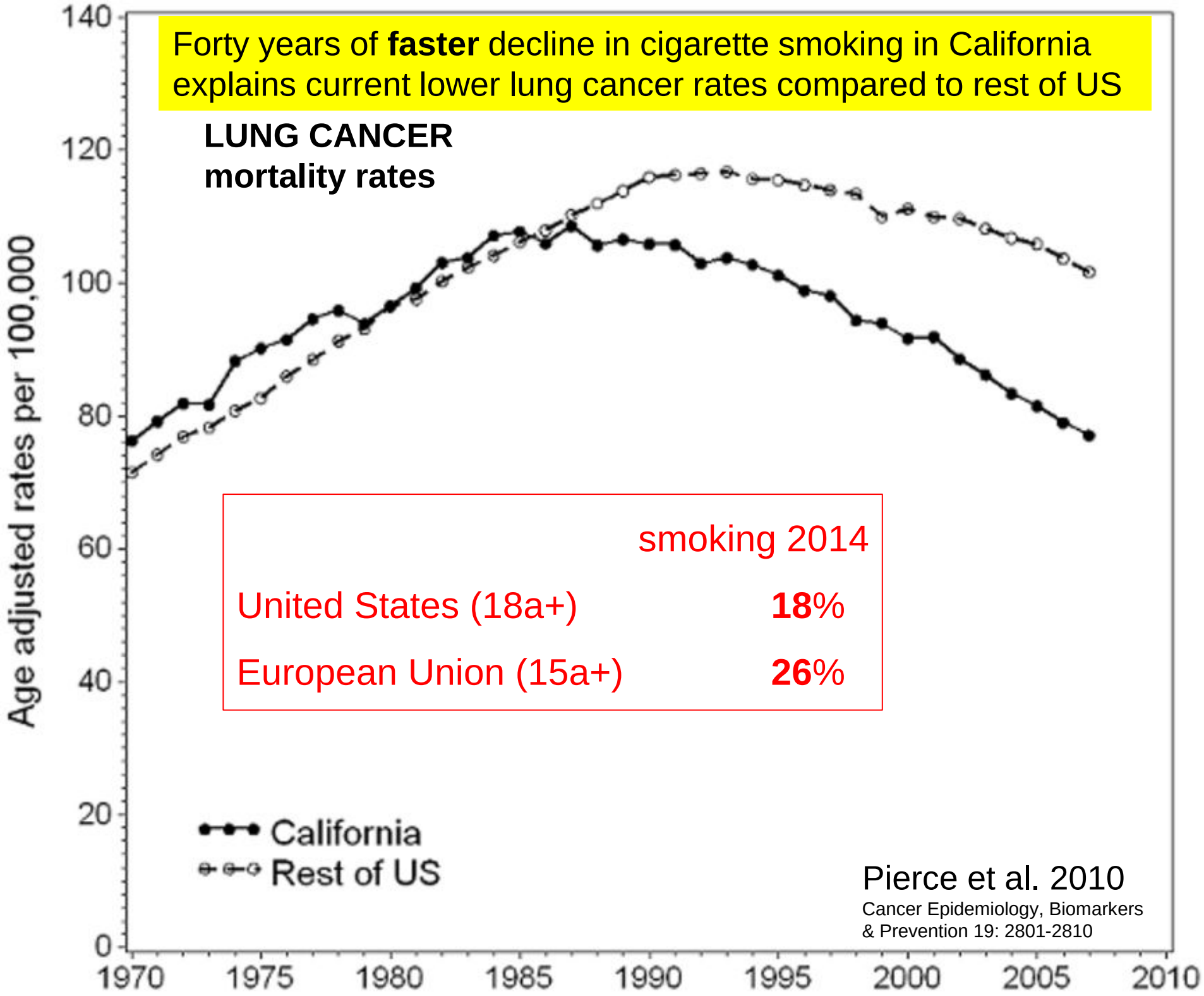
	% smoking ≥ 18a male	% smoking ≥ 18a female	12-17a	tob tax	prevention spending % of CDC min.
Kent	29	28	17	0,9	9,4
Calif	18	11	9	1,6	46,9
Utah	10	9	9	1,3	47,7
U.S.	22	18 (2006)			





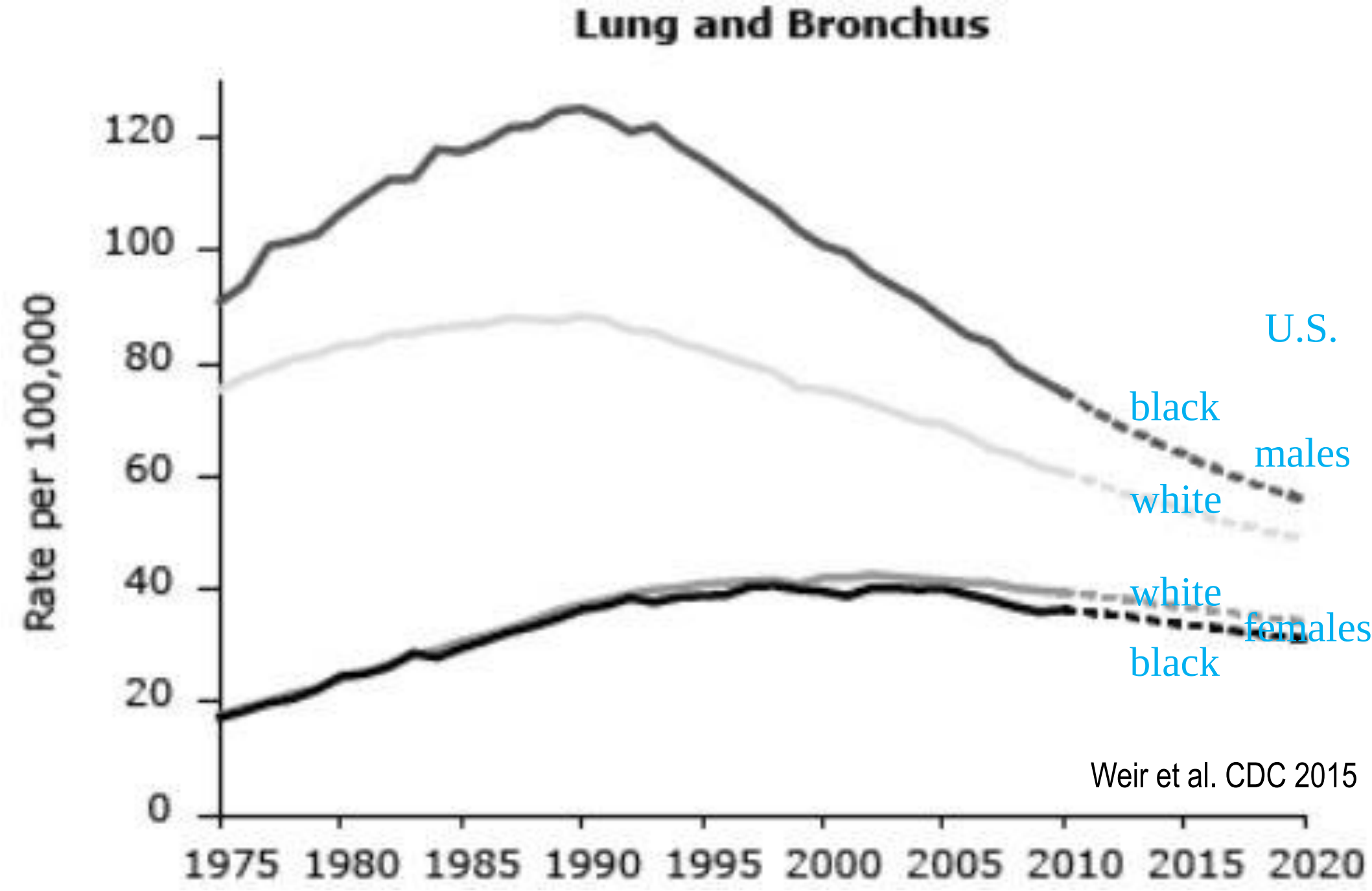
Ahmedin et al. 2008

Forty years of **faster** decline in cigarette smoking in California explains current lower lung cancer rates compared to rest of US



	smoking 2014
United States (18a+)	**18**%
European Union (15a+)	**26**%

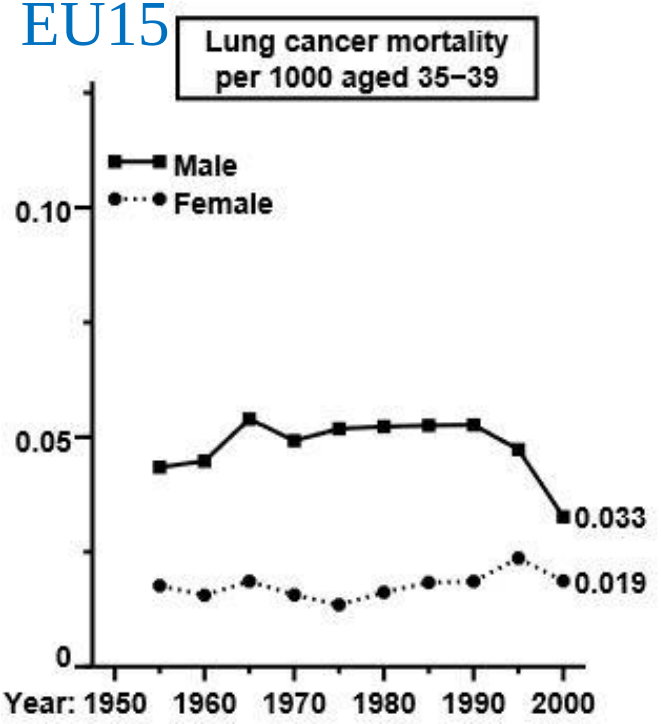
Pierce et al. 2010
Cancer Epidemiology, Biomarkers & Prevention 19: 2801-2810

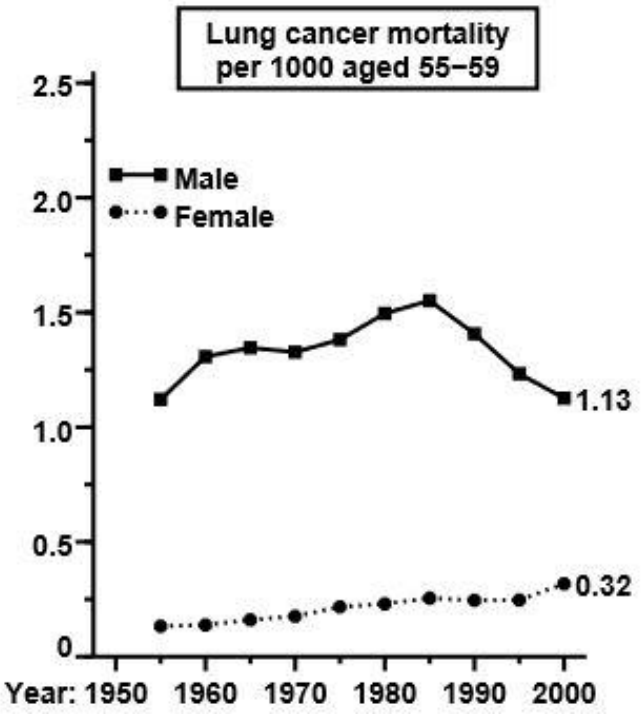


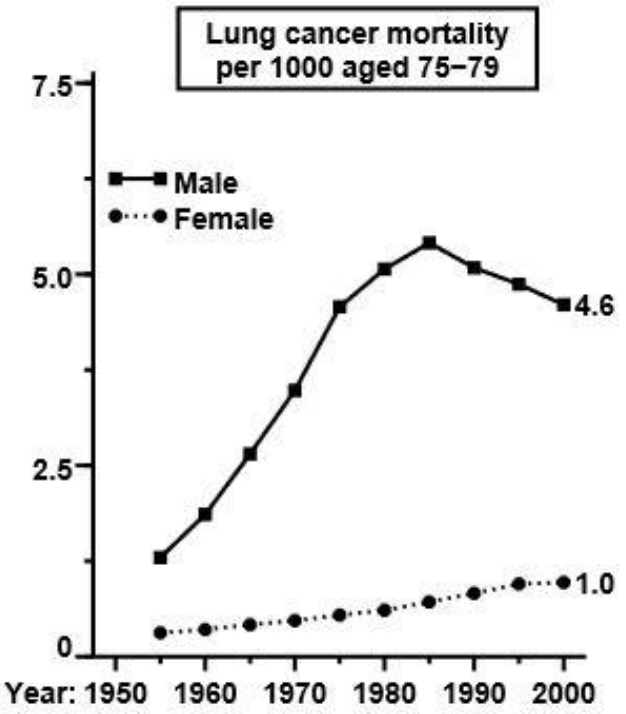
Some EU countries reached peak later in males and are still on the increase in females (2nd peak possible)

Very different in newly industrializing or developing countries

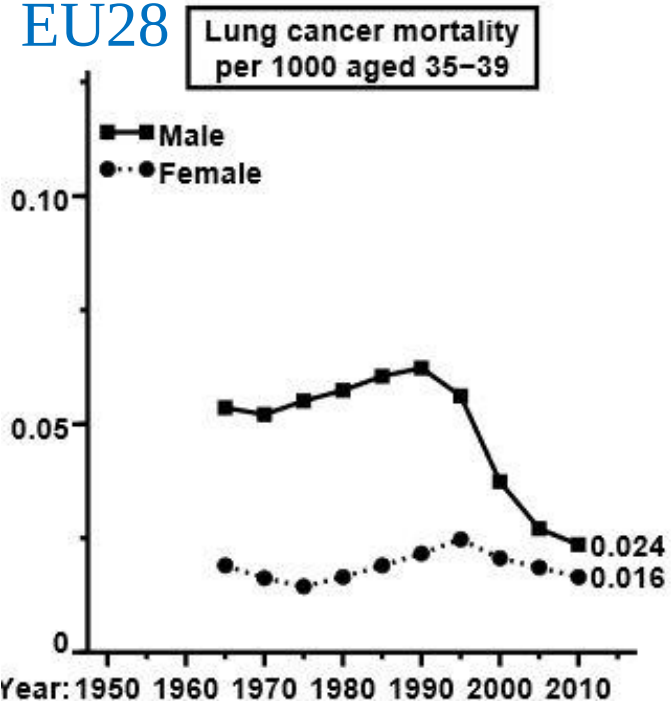
EU15

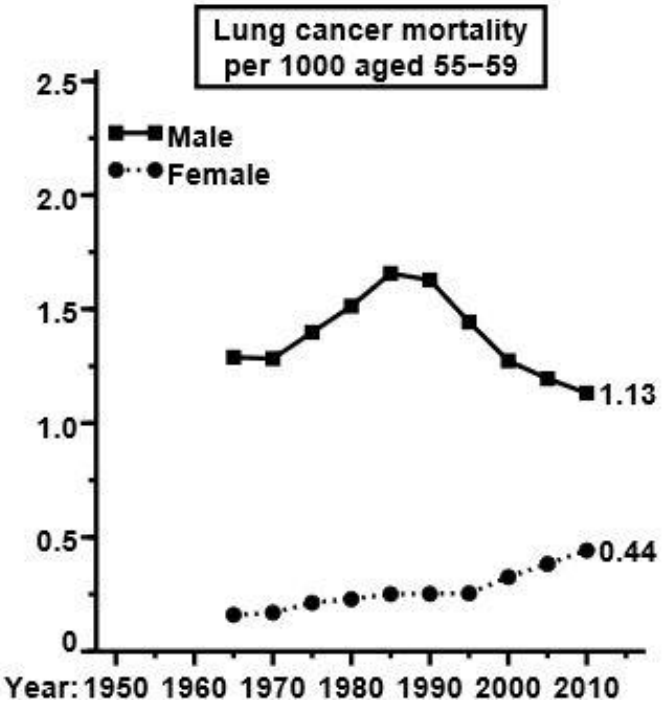


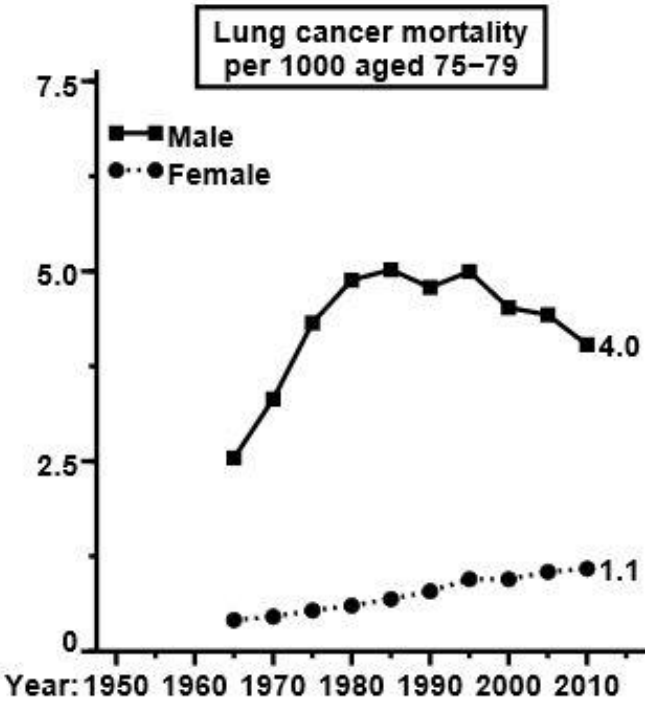




EU28





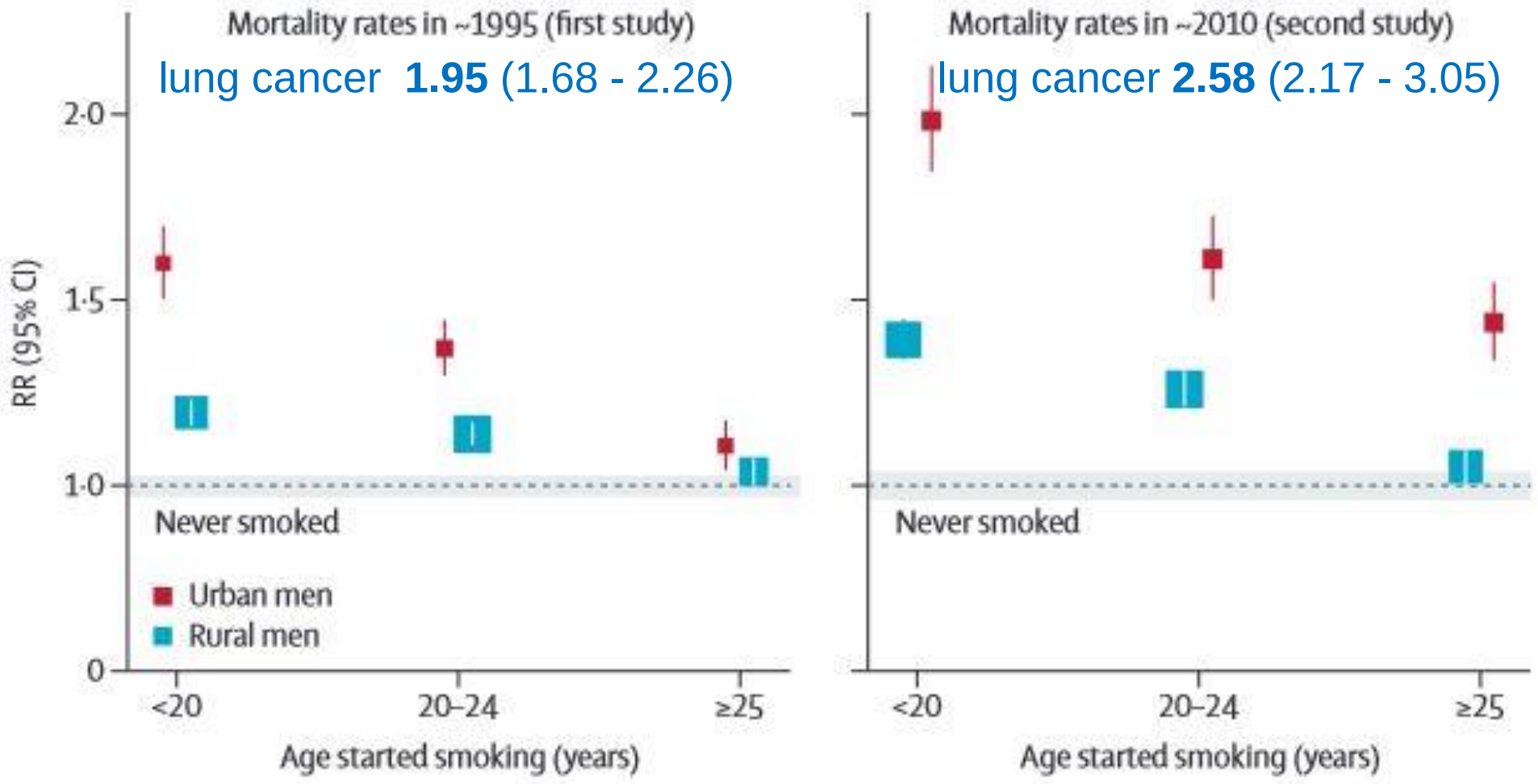


We expect young cases to rise again !

Peto et al. 2011

CHINA: newly industrializing country: 68% male smokers!

Chen et al. 2015. Lancet 386: 144



Chinese men now smoke more than a third of the world's cigarettes: **20% of adult male deaths** in China

One third of young men in China likely to die from smoking, unless they quit

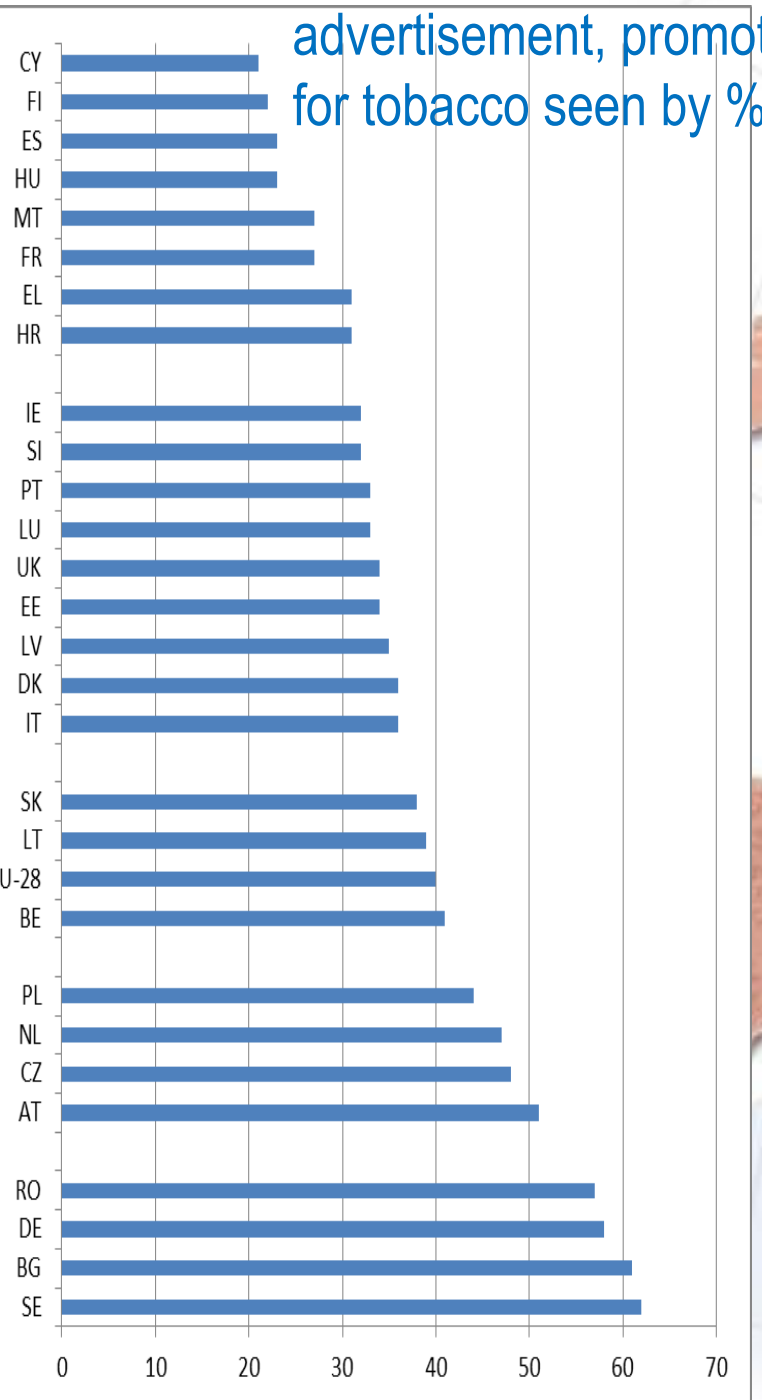
Annual deaths from tobacco 2010: 840,000 men, 130,000 women ➡ 2030: 2 million ➡ 2050: 3 million

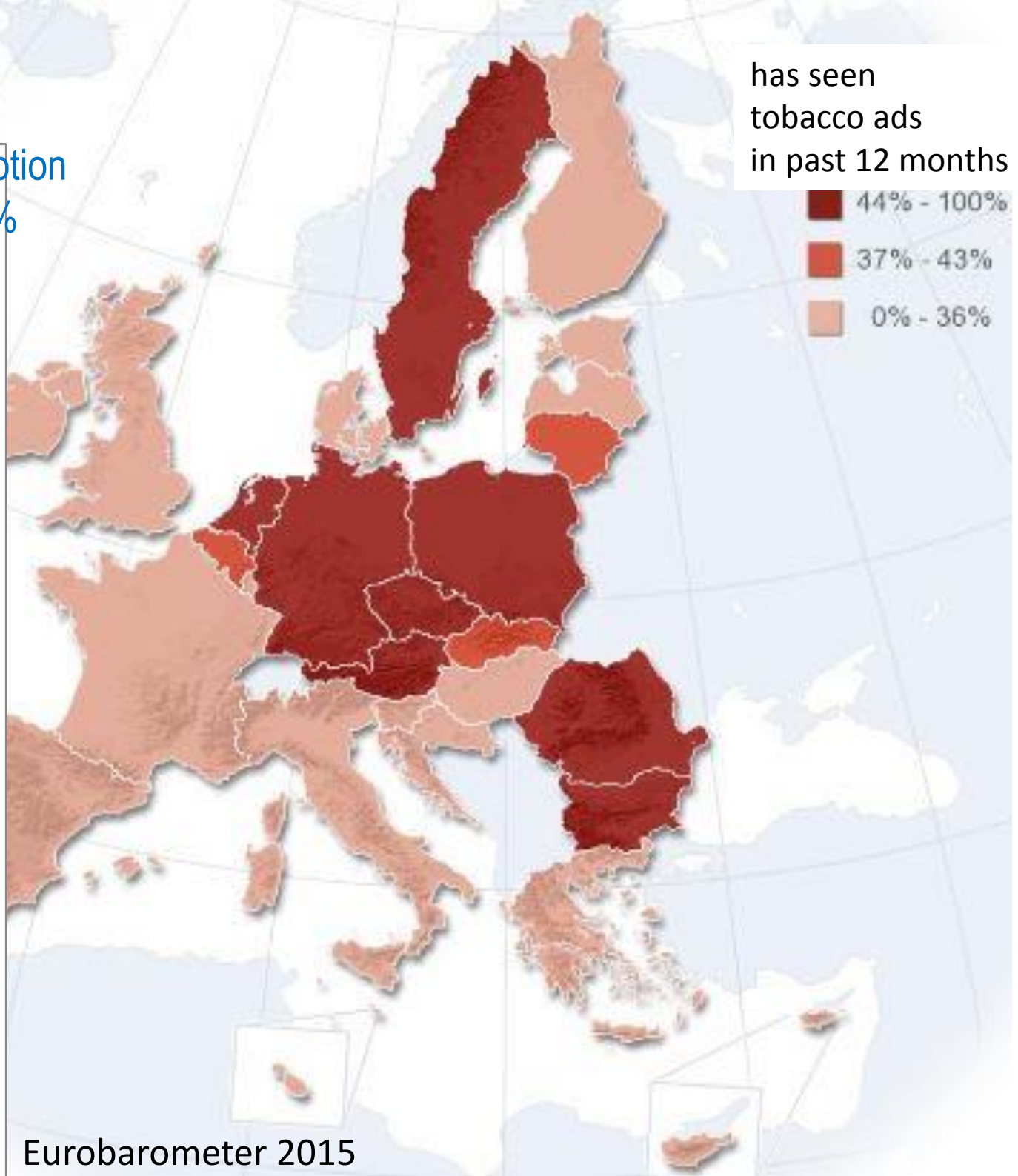
Total deaths	4,578,000	3.144,000

Urgent need of smoking **cessation** for men and smoking **prevention** for women

Women: 3% smokers, but SHS (home, workplace) and indoor pollution (heating, cooking)

Europe is still a main target of the tobacco industry

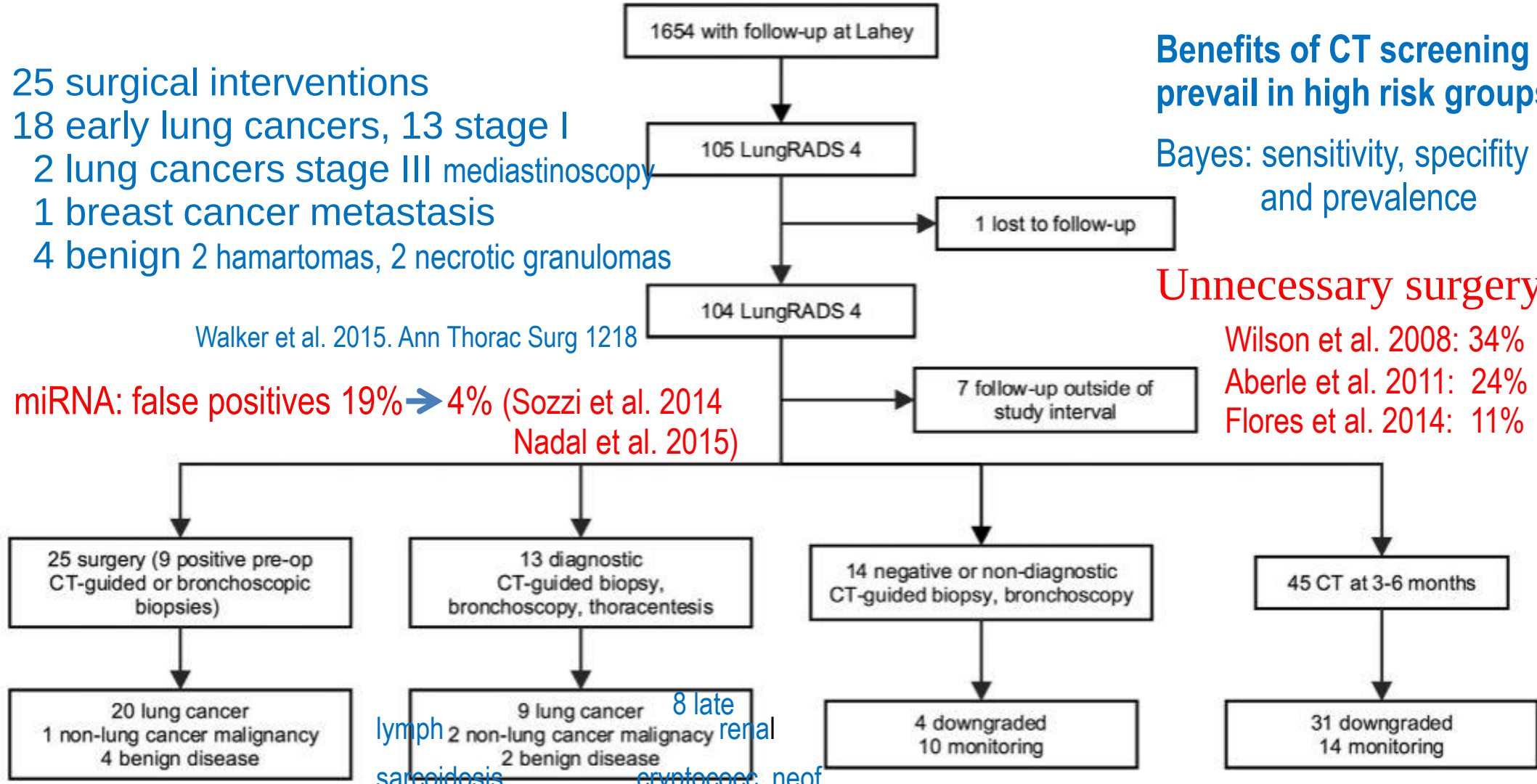




Eurobarometer 2015

Group 1: 55 – 74a, 30+ pack-years, quit within past 15 years → lung cancer mortality decrease by smoking abstinence + LDCT **38% in 15 years** Tanner et al. 2015

Group 2: 50 – 74a, 20+ pack-years, quit (any length) and
history of smoking-related cancer
or lung cancer in 1st degree relative
or chronic lung disease (emphysema, fibrosis),
or known exposure to pulmonary carcinogens



25 surgical interventions
18 early lung cancers, 13 stage I
2 lung cancers stage III mediastinoscopy
1 breast cancer metastasis
4 benign 2 hamartomas, 2 necrotic granulomas

Walker et al. 2015. Ann Thorac Surg 1218

miRNA: false positives 19% → 4% (Sozzi et al. 2014 Nadal et al. 2015)

Benefits of CT screening prevail in high risk groups

Bayes: sensitivity, specifity and prevalence

Unnecessary surgery
Wilson et al. 2008: 34%
Aberle et al. 2011: 24%
Flores et al. 2014: 11%

8 late
lymph renal
sarcoidosis cryptococc neof

Lung cancer **screening** needs to be combined with smoking cessation

Misperceptions:

- Everyone who participates in screening will benefit
- Screening offers protection from lung cancer
- CT yields the same health benefits as smoking cessation
- A cancer-free test result indicates absence of personal harms of smoking
- Cancer is the only consequence of smoking
- Low personal susceptibility to the harms of tobacco

In 49% these beliefs were reinforced and potentially exacerbated by screening and lowered the motivation to participate in smoking cessation programs.

Zeliadt et al. 2015. JAMA Intern Med 175:1530-7

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