Cost Effectiveness of Screening in the National Lung Screening Trial

William C. Black, M.D.
Dartmouth-Hitchcock Medical Center

Outline

ACRIN™ American College of Radiology Imaging Network

- NLST CEA in progress
- Preliminary CEA
- Sources of uncertainty

st Effectiveness Analysis

ACRIN™ American College of Radiology Imaging Network

- Comparison: LDCT vs CXR, None
- Effectiveness: LYs and QALYs
- Costs: $US (reference 2009)
- Perspective: Societal
- Time horizon: Within-trial and lifetime
- Discount rate: 3%

Gold et al. Cost-effectiveness in health and medicine. 1996.

ectiveness (LYs)

ACRIN™ American College of Radiology Imaging Network

- Aggregate LYs from entry to death
- Observed survival before 2009
- Projected survival after 2009
  - age, sex, smoking, lung ca stage

ectiveness (QALYs)

ACRIN™ American College of Radiology Imaging Network

- Adjust LYs for QOL (0-1.0)
- SF-6D utility scoring
- Estimate missing scores
  - age, sex, scr, lung ca

Brazier et al. JHE 2002; 21:271-92

sts

ACRIN™ American College of Radiology Imaging Network

- Direct medical (screening, dx, rx)
- Non-medical (travel, lodging)
- Opportunity (lost wages)
- Projected beyond 2009
  - age, sex, and lung ca stage

ect Medical Costs

ACRIN™
American College of Radiology Imaging Network

- Utilization based on medical abstraction
- Costs from utilization & Medicare prices
- Impute missing costs

seline Results

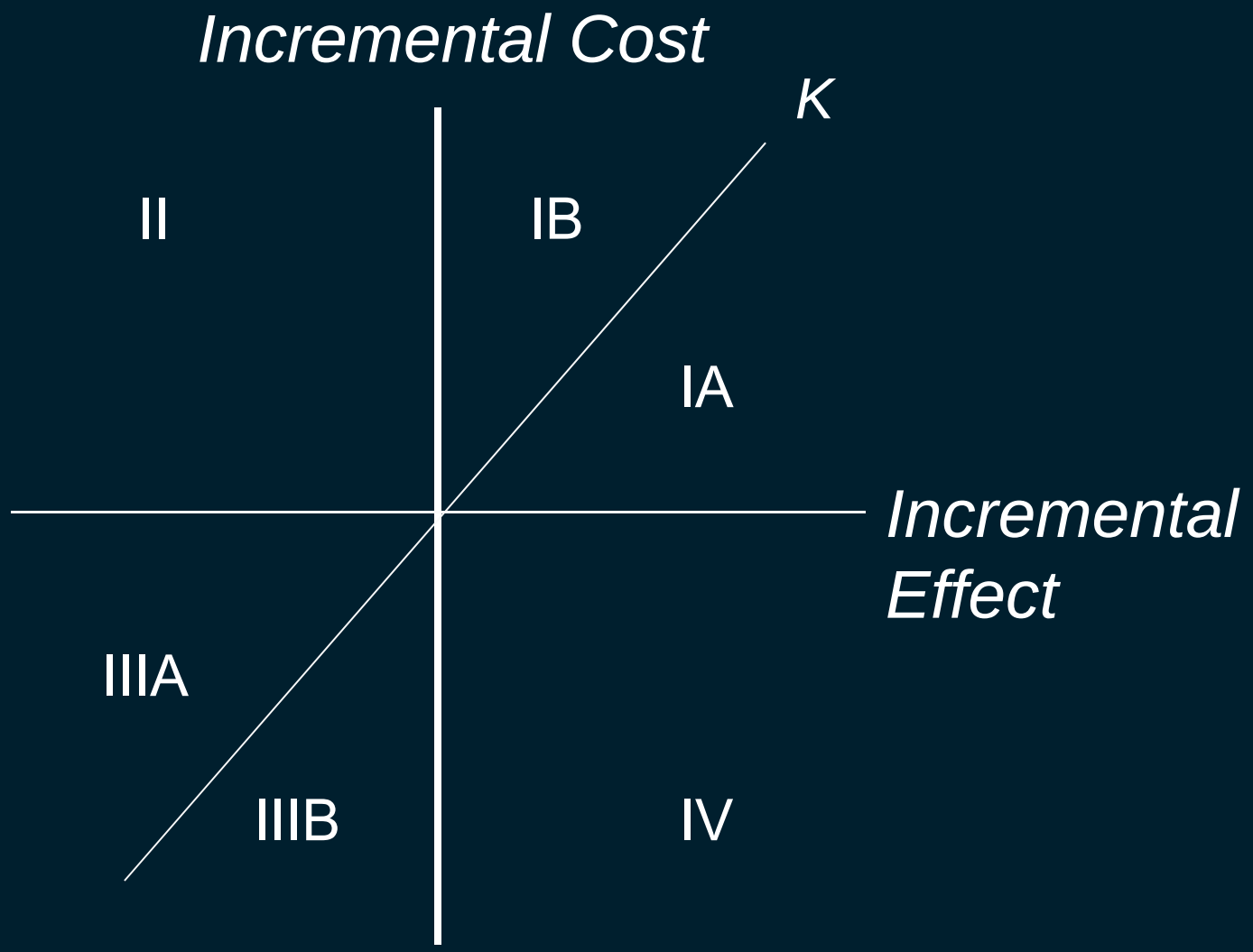
ACRIN™ American College of Radiology Imaging Network

- LYs, QALYs & Costs
- ICER (ΔC/ΔE)
- Subset analyses
  - age, sex, smoke, co-morb

ncertainty

ACRIN™ American College of Radiology Imaging Network

- Sensitivity analysis
- Scatterplot of ICE
- CE acceptability curves



Black WC. Med Decis Making 1990;10:212-4

eliminary CEA

ACRIN™ American College of Radiology Imaging Network

- Comparison: LDCT vs No Scr
- Effectiveness: Life-Years
- Costs: $US (reference 2008)
- Perspective: Societal
- Time horizon: Lifetime
- Discount rate: 3%

ditional Assumptions

ACRIN™ American College of Radiology Imaging Network

- 3 annual LDCT screens
- Cum positivity rate 40%
- 2 additional CTs/ positive LDCT
- Treatment costs cancel out

e Years Per Screenee

ACRIN™ American College of Radiology Imaging Network

Variable	Baseline
Risk[1]	0.017
RRR[1]	0.200
ARR	0.003
YLL[2,3]	12.000
LYGs	0.040

1. http://www.cancer.gov/images/DSMB-NLST.pdf
2. Brown et al. Annu Rev Public Health 2001;22:91-113
3. With adjustment for 3% discount rate

st Per Screenee

ACRIN™ American College of Radiology Imaging Network

Variable	Baseline
LDCT[1]	$300
Non-med[2]	$100
Per screen	$400
Per 3 screens	$1200
Follow-up CT	$320
Total	$1520

1. http://www.cms.gov/apps/physician-fee-schedule/
2. Heitman et al. J Am Coll Radiol 2010;7:943-8

eliminary ICER

Variable	Baseline
Cost	$1,520
LYG	0.040
ICER	$38,000

CT Screening Costs

ACRIN™ American College of Radiology Imaging Network

Perspective	Cost
Societal	$1,520
Screenee	$0-2500
Provider	$???

trapolation from NLST

ACRIN™ American College of Radiology Imaging Network

Variable	ICER
Risk ↓	↑
Screen intensity ↑	↑
Surgical effectiveness ↓	↑
Surgical mortality ↑	↑
Smoking cessation ↑	↓

Year LDCT Screening Costs

ACRIN™ American College of Radiology Imaging Network

Population	Size[1,2]	Cost[3]
Age 55-74, >= 30 pkyrs	8 million	$4 billion
Age 45-64, ever smoker	32 million	$18 billion
Age >= 45, ever smoker	47 million	$26 billion
Age >=18, ever smoker	94 million	$53 billion

1. http://riskfactor.cancer.gov/studies/tus-cps/info.html
2. MMWR Morb Mortal Wkly Rep 2009;58:1227-32
3. $560 first year of screening ($400 + $160)

SNET*

ACRIN™ American College of Radiology Imaging Network

- "Deep" model of natural history
- Extensive sensitivity analyses
- Collaboration with NLST

* Cancer Investigation and Surveillance Modeling Network

UMMARY

ACRIN™ American College of Radiology Imaging Network

- LDCT screening potentially CE
- Dependent on several variables
- Costs vary by perspective
- NLST/ CISNET collaboration
- Future guidelines development