Background

Screening policy across Europe has evolved with regard to its goal:
Participation → informed participation → informed decision for or against

Informed decisions require a *quantitative* assessment of the benefits and harms of cancer screening

This, in turn, requires that

- solid clinical evidence exists
- policy makers evaluate the clinical evidence appropriately
- the evidence is communicated understandably
- physicians and patients eventually understand the evidence

⇒ Only the first condition is fulfilled

Arkes & Gaissmaier (2012) *Psychological Science*
Gaissmaier & Gigerenzer (2011) *Better Doctors, Better Patients, Better Decisions*
Gigerenzer, Gaissmaier, Kurz-Milcke, Schwartz & Woloshin (2007) *Psychological Science in the Public Interest*

The evidence is not assessed appropriately

How should evidence be evaluated?

Treatment	Result: +	Result: -
yes	A	B
no	C	D

beneficial	$A/(A+B) > C/(C+D)$
useless	$A/(A+B) = C/(C+D)$
harmful	$A/(A+B) < C/(C+D)$

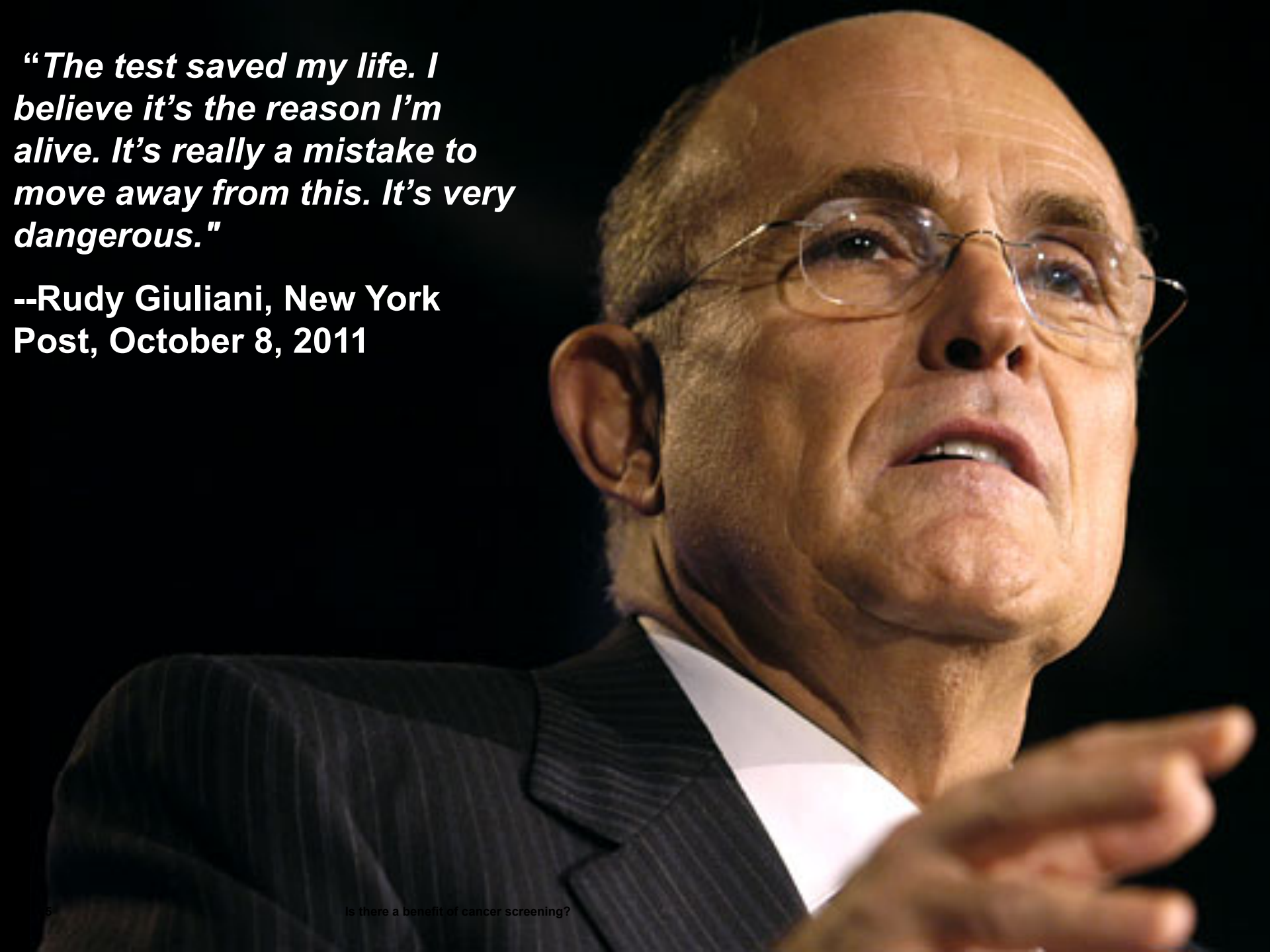
useless $A/(A+B) = C/(C+D)$

U.S. Preventive Services Task Force

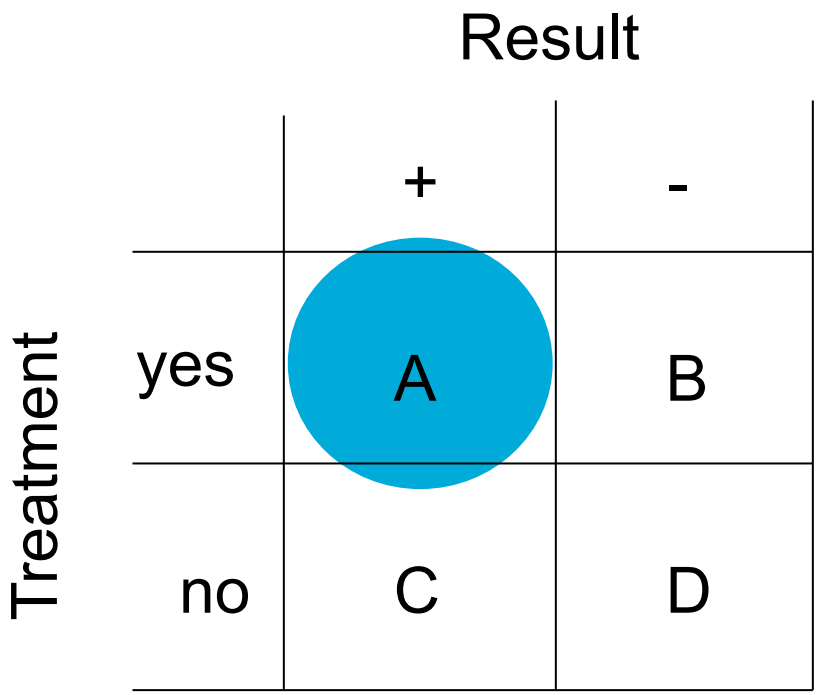
The U.S. Preventive Services Task Force (USPSTF) recommends against prostatespecific antigen (PSA)-based screening for prostate cancer.

The USPSTF concludes that there is moderate certainty that the harms of PSA-based screening for prostate cancer outweigh the benefits.

Arkes & Gaissmaier (2012). *Psychological Science*


"The test saved my life. I believe it's the reason I'm alive. It's really a mistake to move away from this. It's very dangerous."
--Rudy Giuliani, New York Post, October 8, 2011

Cell A bias



beneficial $A/(A+B) > C/(C+D)$

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Arkes & Gaissmaier (2012). *Psychological Science*
Gaissmaier, Anderson, & Schulkin (2014). *Medical Decision Making*

Prostate Cancer Early Detection

HARDING CENTER FOR RISK LITERACY

by PSA screening and digital-rectal examination.
Numbers are for men aged 50 years or older, not participating vs. participating in screening for 13 years.

	1,000 men without screening	1,000 men with screening
Benefits		
How many men died from prostate cancer?	5*	4
How many men died from any cause?	200	200
Harms		
How many men were diagnosed and treated** for prostate cancer unnecessarily?	–	30
How many men without cancer got a false alarm and a biopsy?	–	170

* This means that about 5 out of 1,000 men (50+ years of age) without screening died from prostate cancer within 13 years.

** With prostate removal or radiation therapy, which can lead to incontinence or impotence.

Source: Schröder FH, Hugosson J, Roobol MJ, et al. (2014). *The Lancet.*

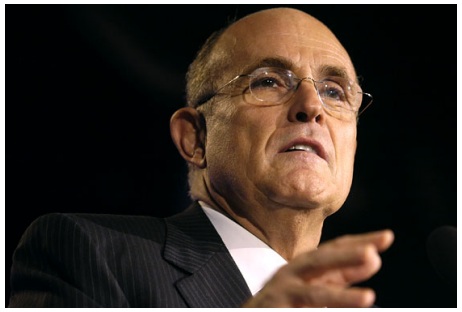
Risk communication is often misleading

Anecdotes are more persuasive than statistics

U.S. Preventive Services Task Force

The USPSTF concludes that there is moderate certainty that the harms of PSA-based screening for prostate cancer outweigh the benefits.

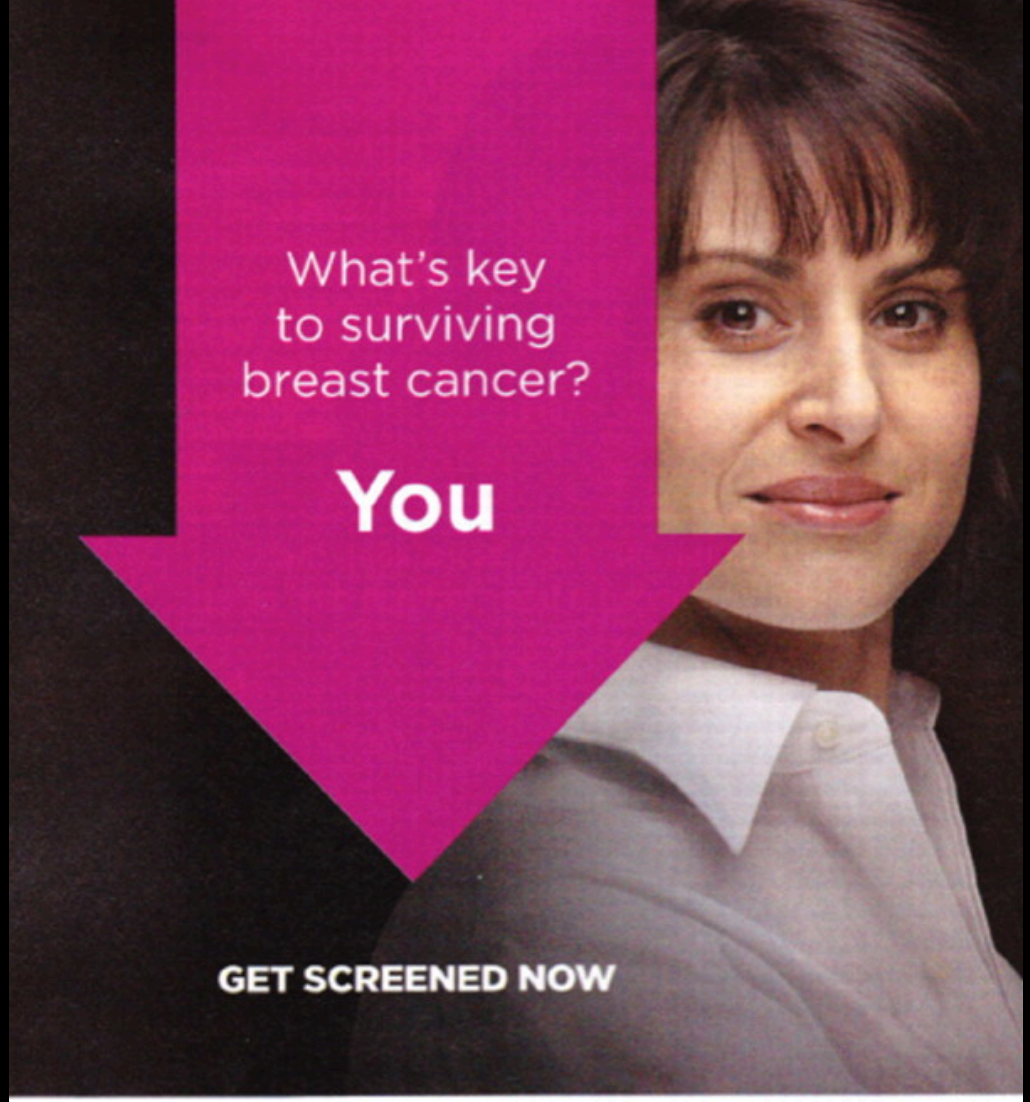
USPSTF Draft report, Oct, 2011



“The (PSA) test saved my life. I believe it’s the reason I’m alive. It’s really a mistake to move away from this. It’s very dangerous.“

Rudy Giuliani, New York Post, Oct 8, 2011

Arkes & Gaissmaier (2012). *Psychological Science*



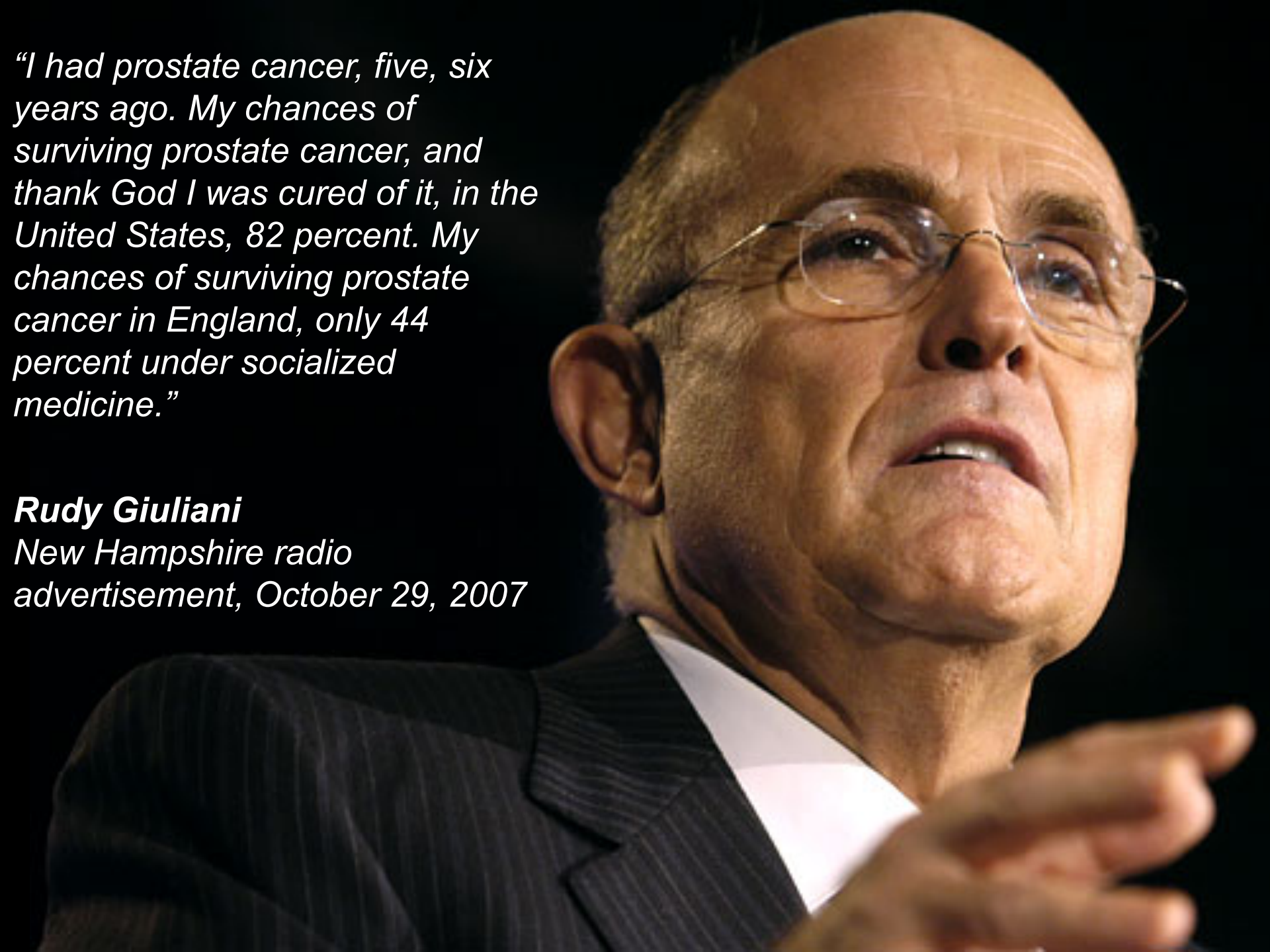
LESS TALK. MORE ACTION.

susan g. komen.

Early detection saves lives. **The 5-year survival rate for breast cancer when caught early is 98%. When it's not? 23%.**

Visit **komen.org/getscreened** or scan this code with a QR reader app on your smart phone to start making a difference.

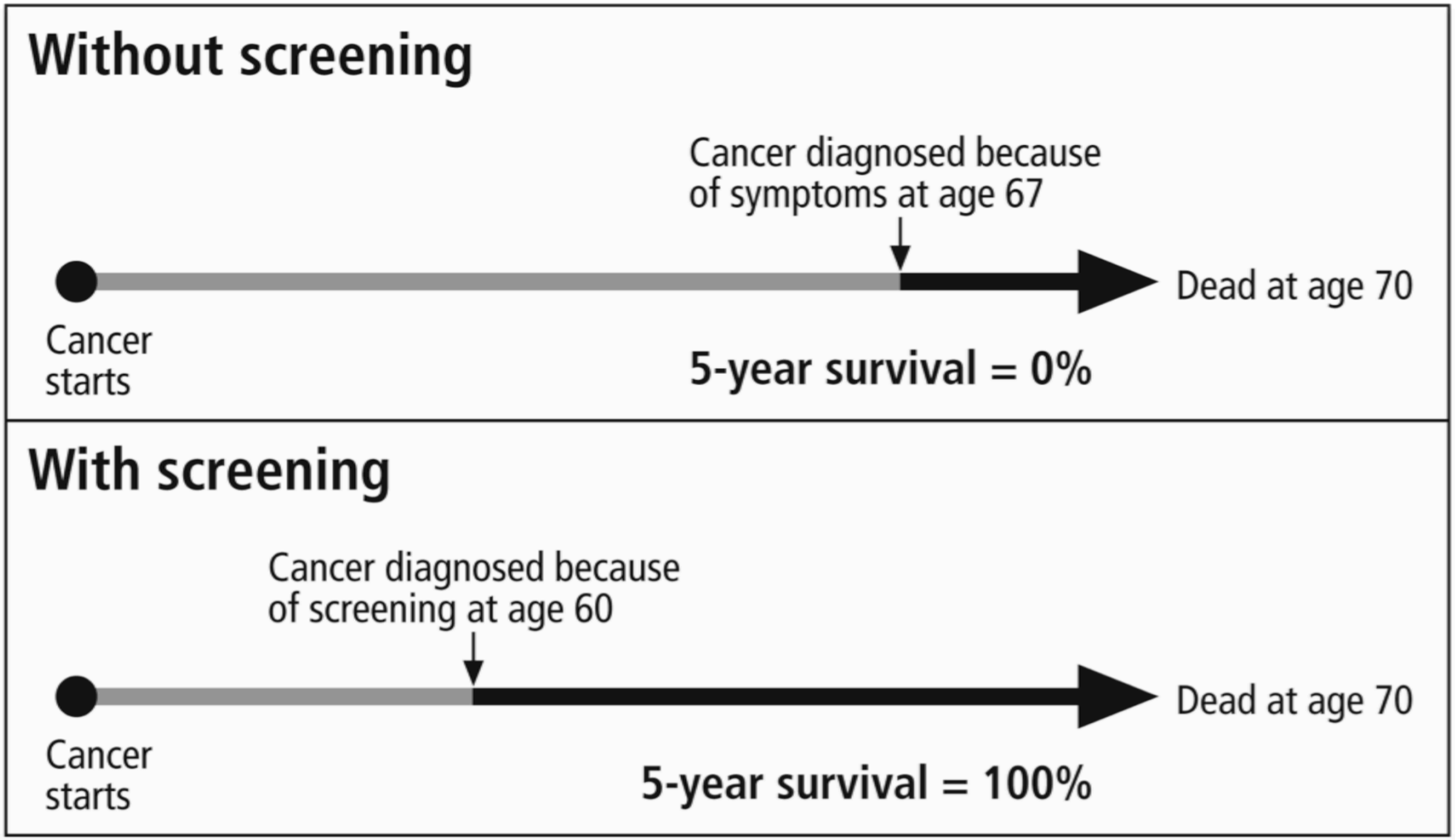
Find us on Facebook



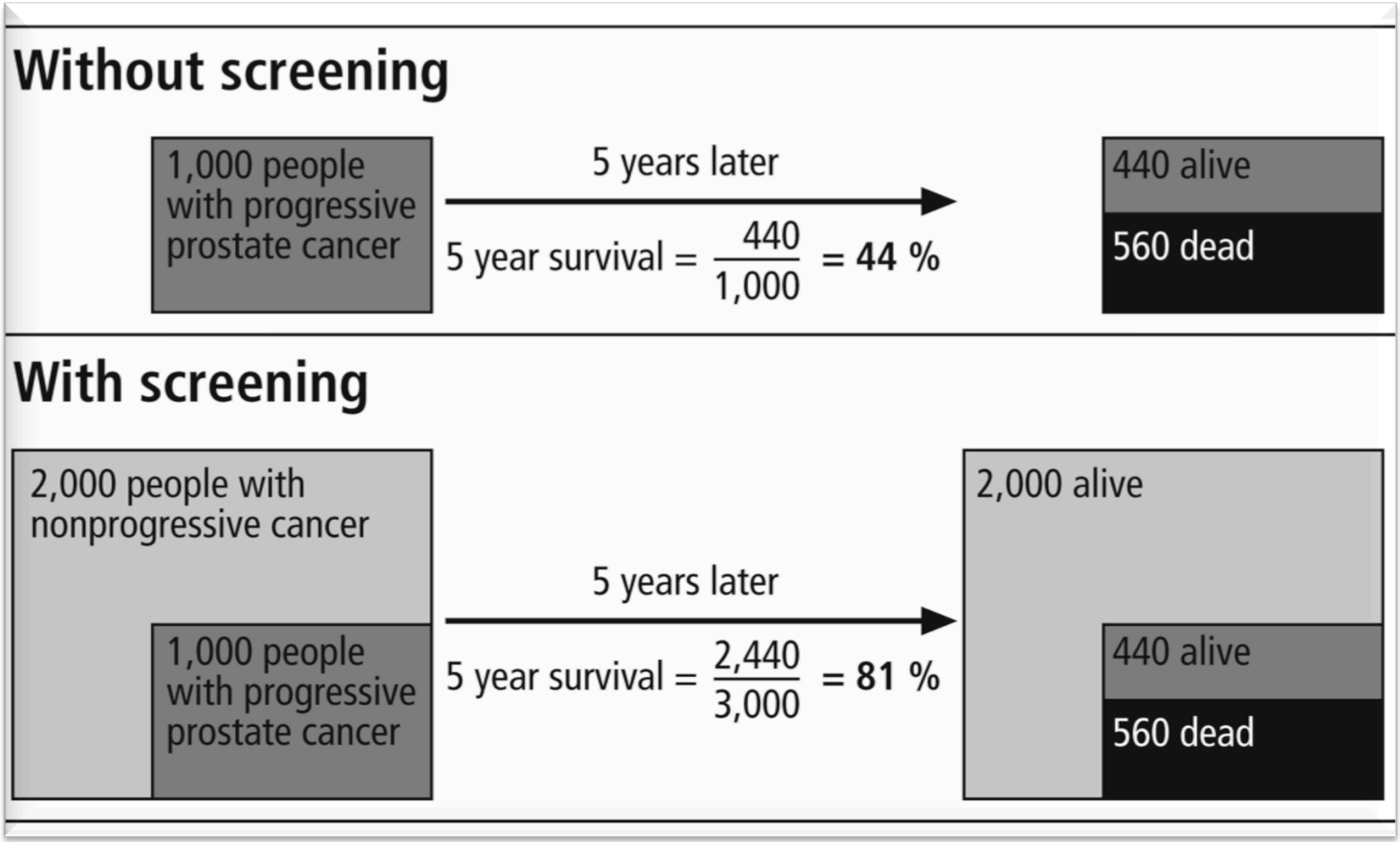
“I had prostate cancer, five, six years ago. My chances of surviving prostate cancer, and thank God I was cured of it, in the United States, 82 percent. My chances of surviving prostate cancer in England, only 44 percent under socialized medicine.”

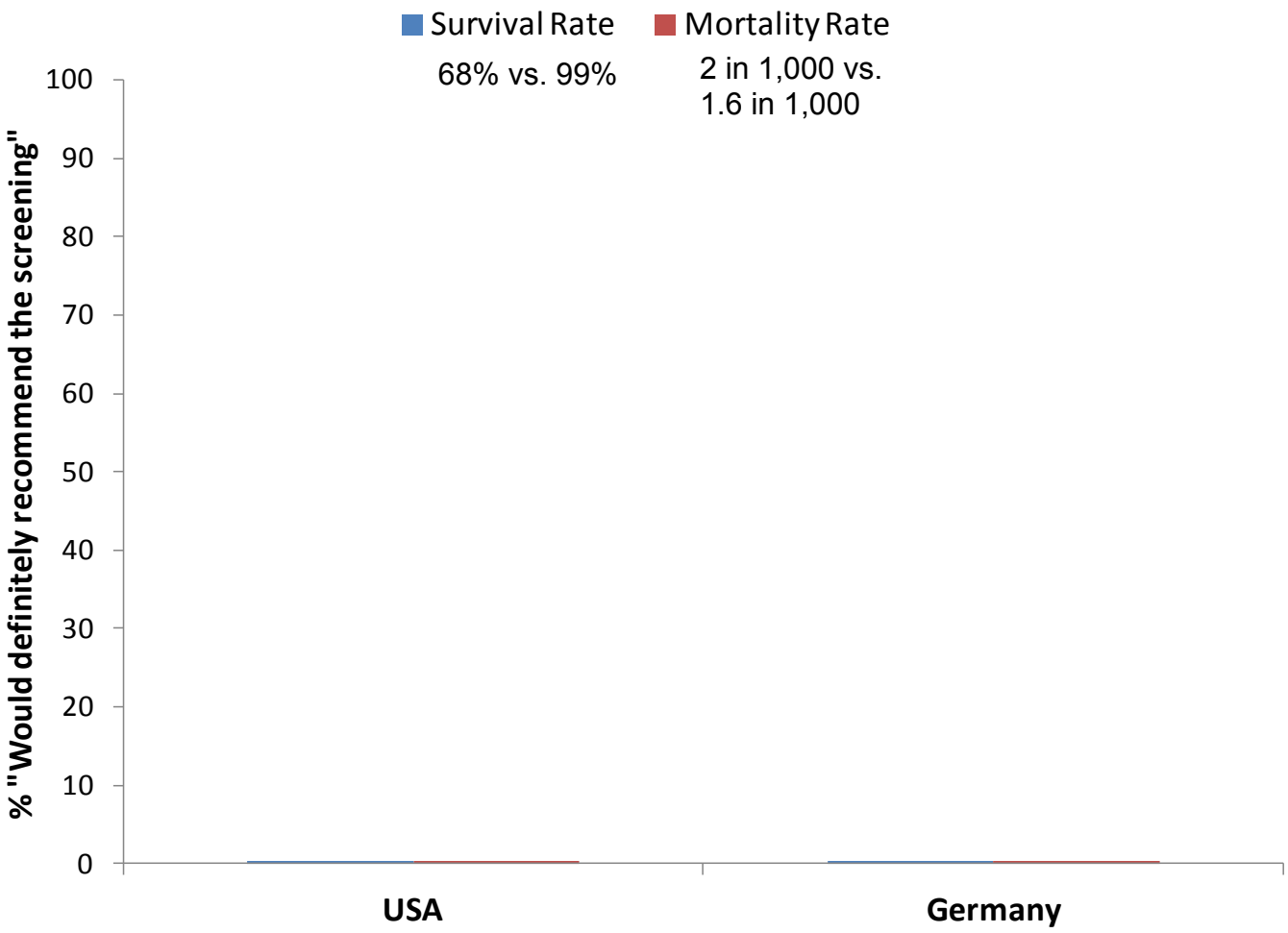
Rudy Giuliani
New Hampshire radio advertisement, October 29, 2007

Lead time bias



Overdiagnosis bias

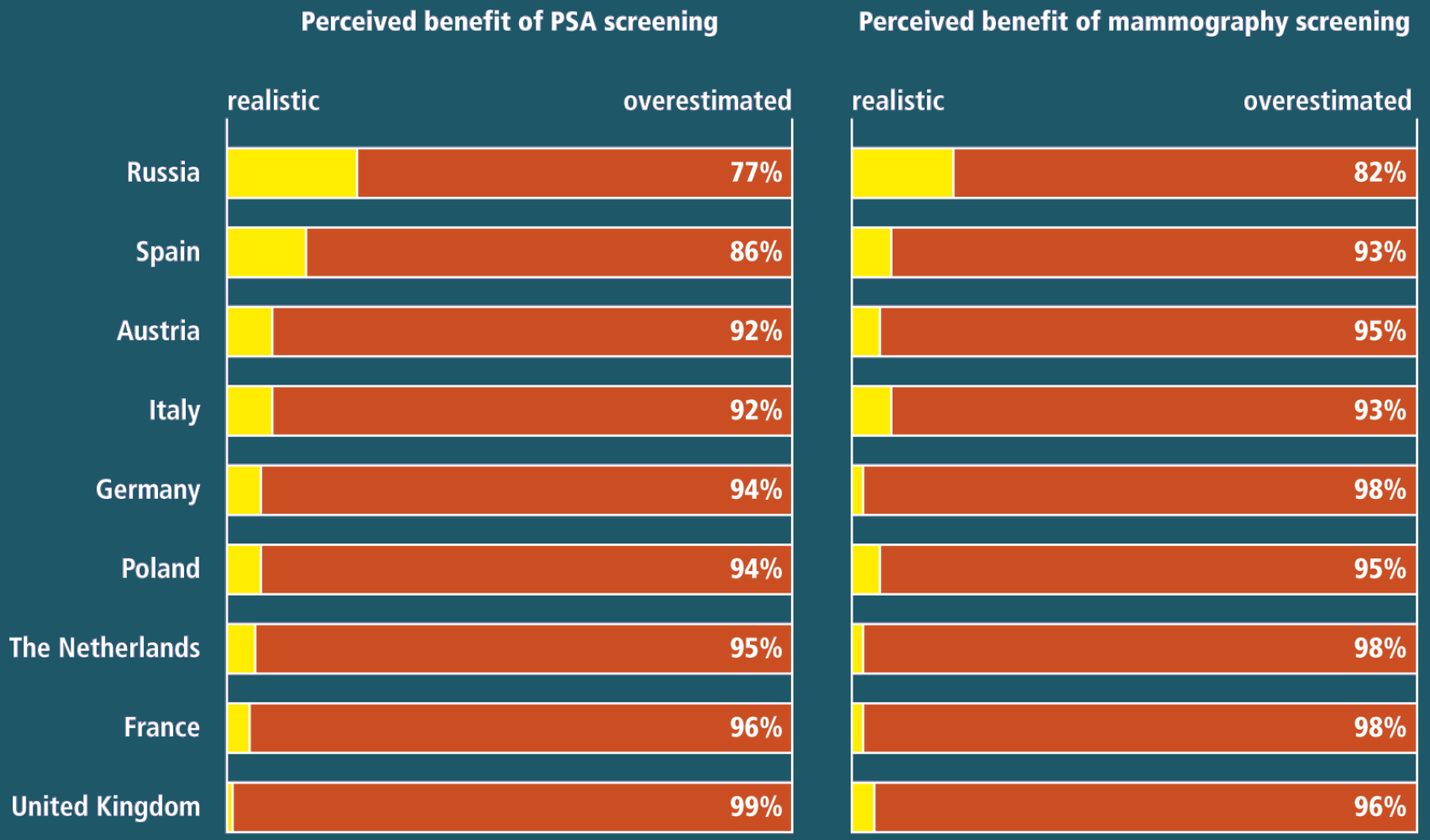




Wegwarth, Schwartz, Woloshin, Gaissmaier, & Gigerenzer (2012). *Annals of Internal Medicine*
Wegwarth, Gaissmaier, & Gigerenzer (2010). *Medical Decision Making*

Patients and physicians often lack understanding

The benefits of screening are vastly overestimated



Gigerenzer, Mata, & Frank (2009) *JNCI*

Physicians‘ knowledge about PSA screening

Survey of 300 US and 300 German general practitioners.

- Most physicians recommend the PSA test routinely to their male patients age 50+ (USA: 80%, G: 81%)
  ⇒ counter to the USPSTF recommendation

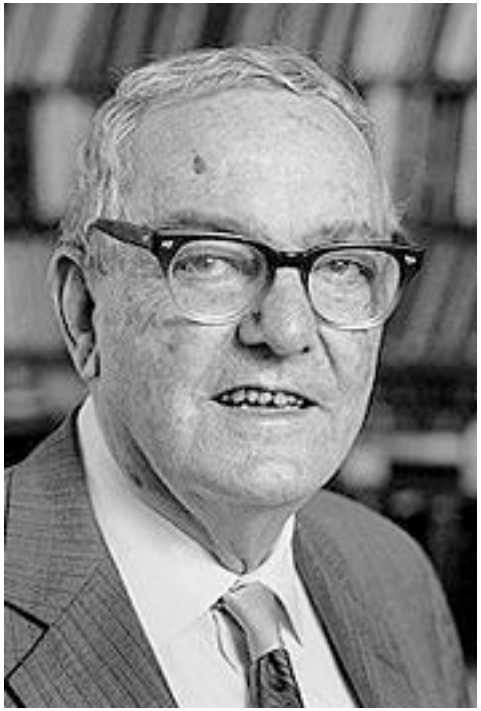
- A reason that often contributes to this recommendation is that they believe the test causes more benefits than harms (USA: 68%, G: 77%)
  ⇒ counter to the evidence and USPSTF assessment

- A substantial proportion does not believe that the test can also cause harm (USA: 29%, G: 47%)
  ⇒ Counter to the evidence

Gaissmaier et al. (in preparation)

Insight is possible with transparent risk communication

Insight



Herbert A. Simon
1916 - 2001

“Solving a problem simply means representing it so as to make the solution transparent“
Herbert A. Simon, 1961

Transparency: Facts boxes

Simple tabular representation

Balanced overview of benefits and harms

Reducing the information to the most relevant pieces

⇒ Are very well accepted by patients
⇒ Facilitate comprehension as well as the identification of superior options

Schwartz, Woloshin, & Welch (2007) *Medical Decision Making*
Schwartz, Woloshin, & Welch (2009) *Annals of Internal Medicine*

Breast Cancer Early Detection

HARDING CENTER FOR RISK LITERACY

by mammography screening

Numbers for women aged 50 years or older who participated in screening for 10 years or more

	1,000 women without screening	1,000 women with screening
Benefits		
How many women died from breast cancer?	5	4
How many women died from all types of cancer?	21	21
Harms		
How many women without cancer experienced false alarms or biopsies?	–	100
How many healthy women were diagnosed and treated for breast cancer unnecessarily?	–	5

Source: Gøtzsche, PC, Jørgensen, KJ (2013). *Cochrane Database of Systematic Reviews* (6): CD001877. Numbers in the facts box are rounded. Where no data for women above 50 years of age are available, numbers refer to women above 40 years of age. www.harding-center.mpg.de

Graphical representations

- can help people understand statistical information
- are preferred
- can reduce unwanted influences (e.g., anecdotes) and reduce judgment errors
- can support healthy behaviors

Arkes & Gaissmaier (2012) *Psychological Science*
Gaissmaier et al. (2012) *Health Psychology*
Trevena, Zikmund-Fisher, Edwards, Gaissmaier, et al. (2013) *BMC Medical Informatics and Decision Making*

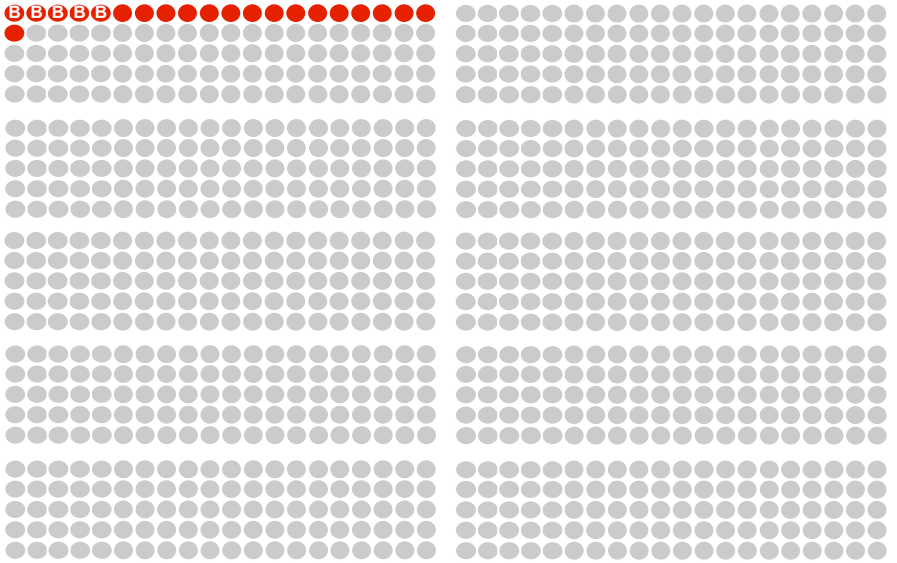
Breast Cancer Early Detection

HARDING CENTER FOR RISK LITERACY

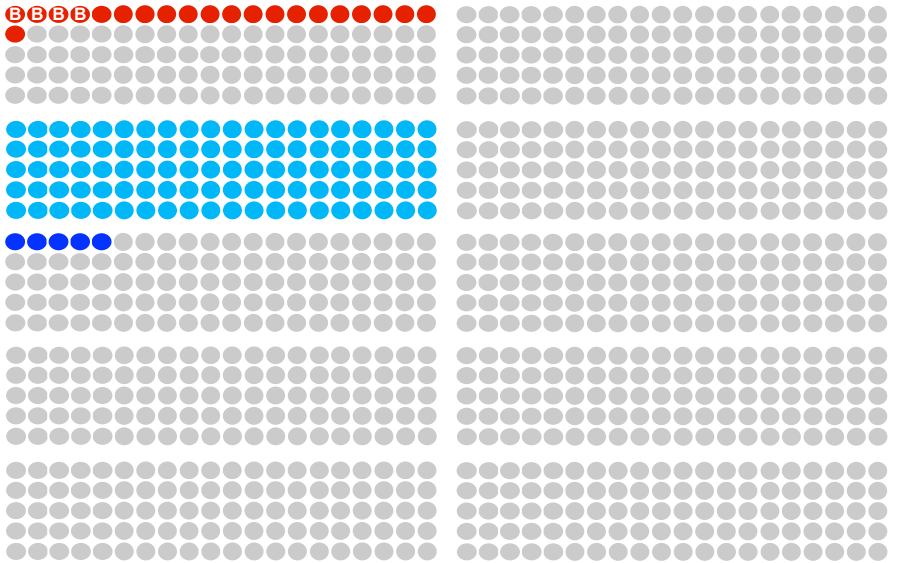
by mammography screening

Numbers for women aged 50 years or older who participated in screening for 10 years or more

1000 women without screening:



1000 women with screening:



	1000 women without screening:	1000 women with screening:
Women who died from breast cancer:	5	4
Women who died from all types of cancer:	21	21
Women who learned after a biopsy that their diagnosis was a false-positive:	–	100
Women who were diagnosed and treated for breast cancer unnecessarily:	–	5
Remaining women:	979	874

Source:
Gøtzsche, PC, Jørgensen, KJ (2013). *Cochrane Database of Systematic Reviews* (6): CD001877
Numbers in the facts box are rounded. Where no data for women above 50 years of age are available, numbers refer to women above 40 years of age.
www.harding-center.mpg.de

Conclusion

There is solid clinical evidence on prostate and breast cancer screening

The benefit/harm ratios do not warrant strong recommendations in favor of screening

An informed-decision-making-approach is necessary

However, informed decisions are undermined, because the evidence is often not appropriately assessed, understood and communicated by

- policy makers,
- physicians,
- and patients.

We need to and can communicate benefits and harms transparently to enable patients to make informed decisions according to their values