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Assessing CI Trends - the facts behind the stats

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Presentation overview

- Background to the study
- Challenges
  - Why it's not as simple as fitting a trend line through data
- Examples
  - Effect of changes in heart attack diagnosis
  - Effect of Cardiovascular Screening Programme on risk factors for heart attack
  - Effect of screening for cancer

Background to the study

- UK CI market
  - Association of British Insurers (ABI) standard definitions
  - Many policies sold with fully guaranteed premiums
- Conditions studied
  - Cancer (major sites, each considered separately)
  - Heart attack
  - Stroke
  - Coronary Artery Bypass Graft
  - Multiple Sclerosis
  - Benign Brain Tumour
  - Kidney Failure

Challenges

- Availability and suitability of data

  Examples:

  – Insufficient insured lives data so use population data
  – Availability of first ever-incidence data

- Features reflected by data and different future circumstances

  Examples:

  – Observed trends but risk factors not well understood
  – Changes in diagnostic methods (past and future)

Changes in heart attack diagnosis

What is a heart attack?

The death of a portion of the heart muscle as a result of inadequate blood supply as evidenced by:

- an episode of typical chest pain

- new electrocardiograph changes;

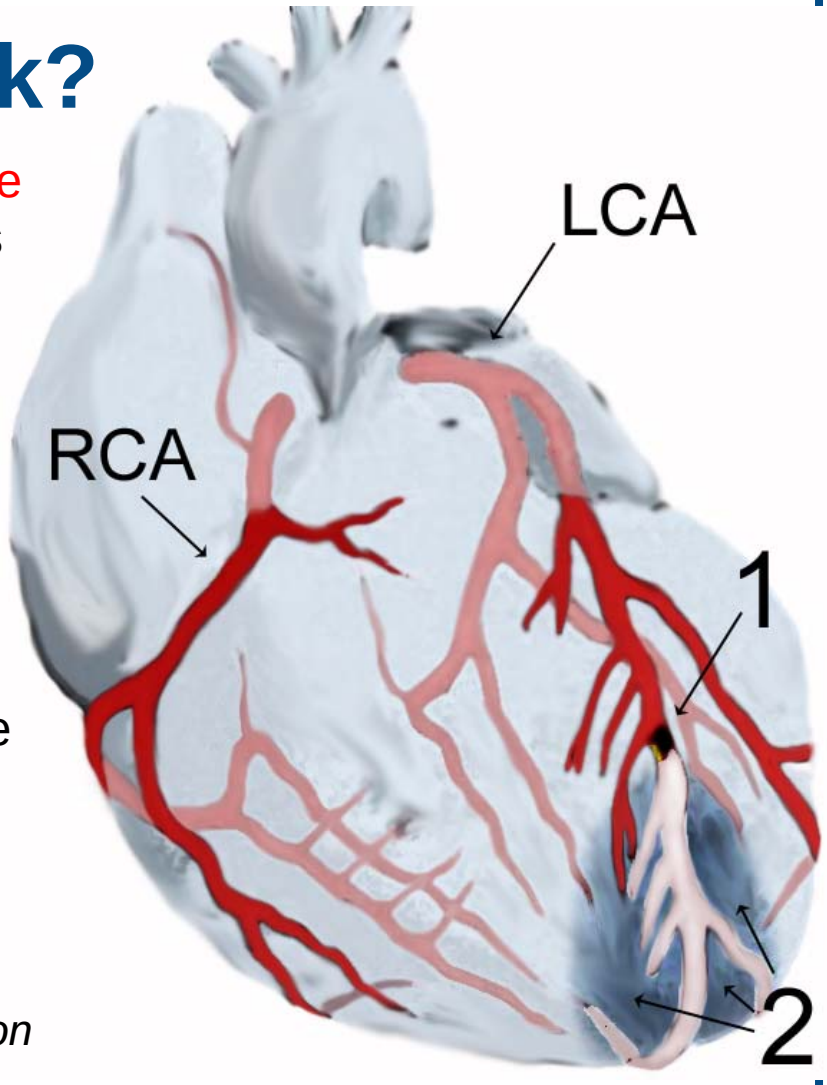
and by

- the elevation of cardiac enzymes.

The evidence must be consistent with the diagnosis of heart attack.

Source: ABI SOBP for CI Cover 1999

Similar to the classic World Health Organisation definition



Source: Wikipedia Commons

… depends on who and when you ask

Medical advances

Mid 1960s:
CK and later CK-MB measurement

Early 1990s:
Evolution of cardiac troponin assays

Clinical heart attack definition

1979:
WHO criteria for diagnosis of MI

2000:
Heart attack redefined - criteria now include elevated troponin levels

2007:
New universal heart attack definition

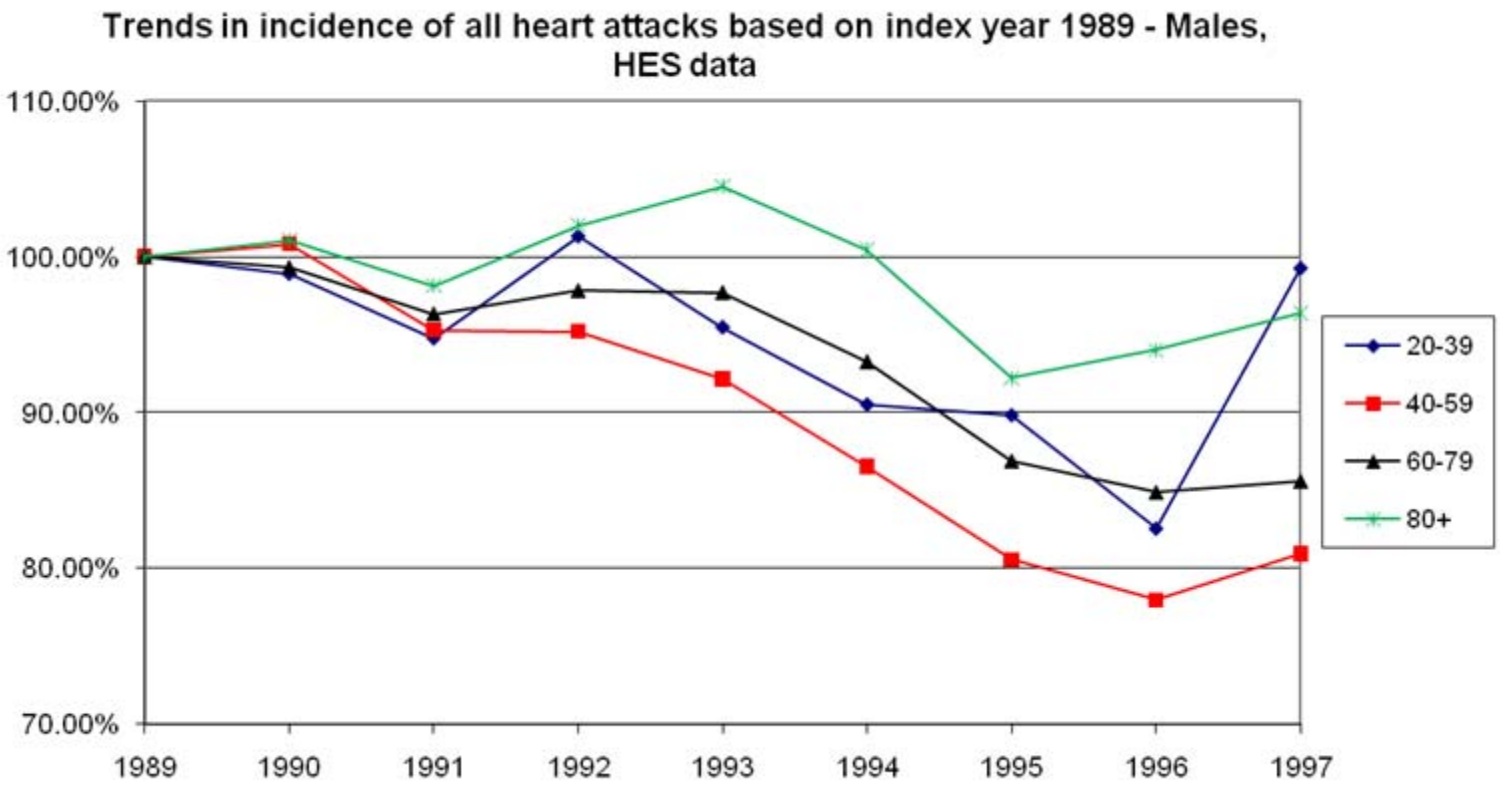
ABI heart attack definition

1999 SoBP CI
Original heart attack criteria

Revision 2002
Allowed troponin increase as evidence

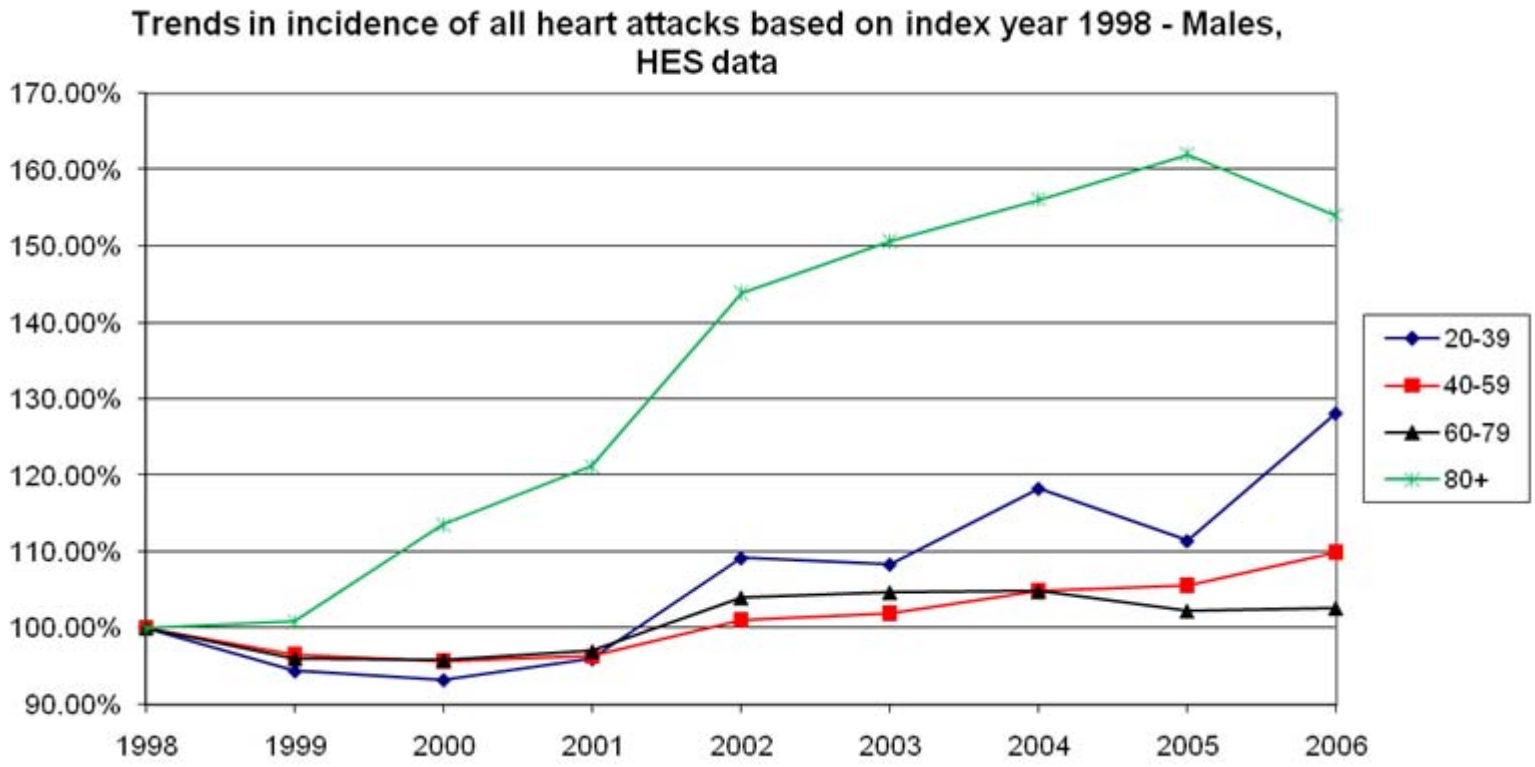
Revision 2006
Minimum troponin level requirement
e.g. cTnT > 1.0 ng/ml

Trends in diagnosed heart attacks



- Improvements driven by improving risk factors
- Similar trend pattern for females

Trends in diagnosed heart attacks (cont.)

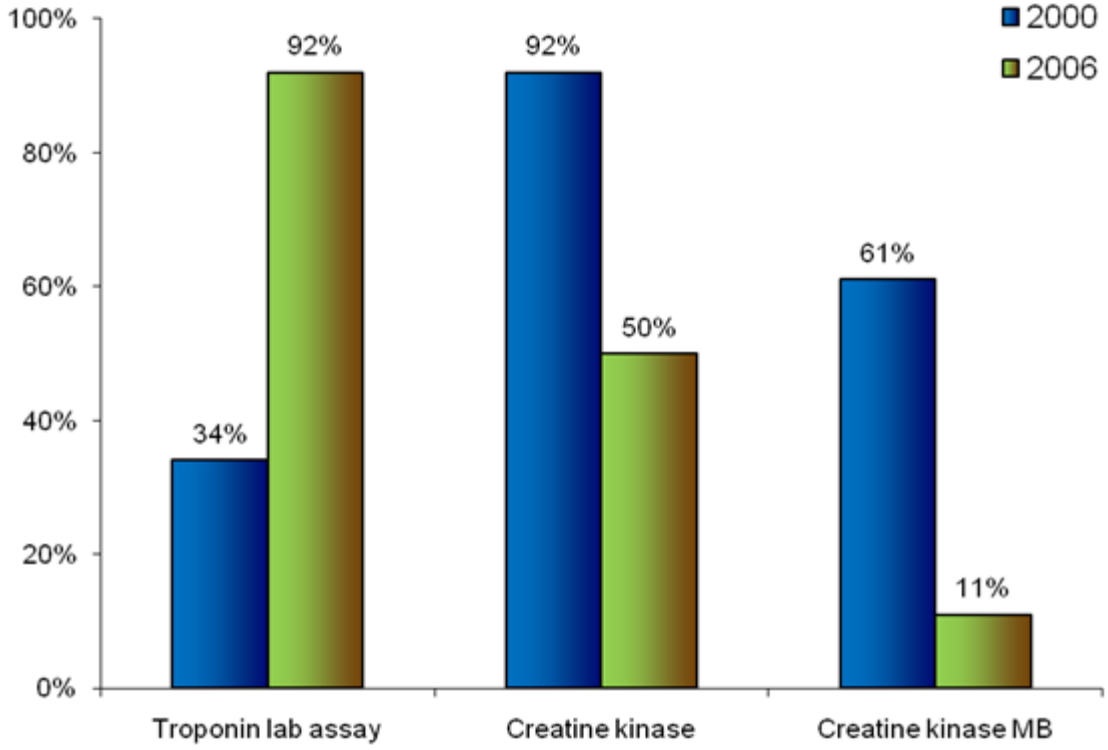


- Deteriorations:
  - More cases classified as heart attack with increased use of troponin
  - More recurrent heart attacks in older ages

Adoption of troponin in the UK

MINAP survey 2006

Troponin versus CK measurement in hospitals in England and Wales, 2000 and 2006



Source: National Audit of Myocardial Infarction Project (MINAP). Royal College of Physicians 2007.

Insured lives versus general population

- Insurance vs clinical definition of heart attack

➡ Need to adjust for severity criteria in CI definitions

- Changes in smoker prevalence

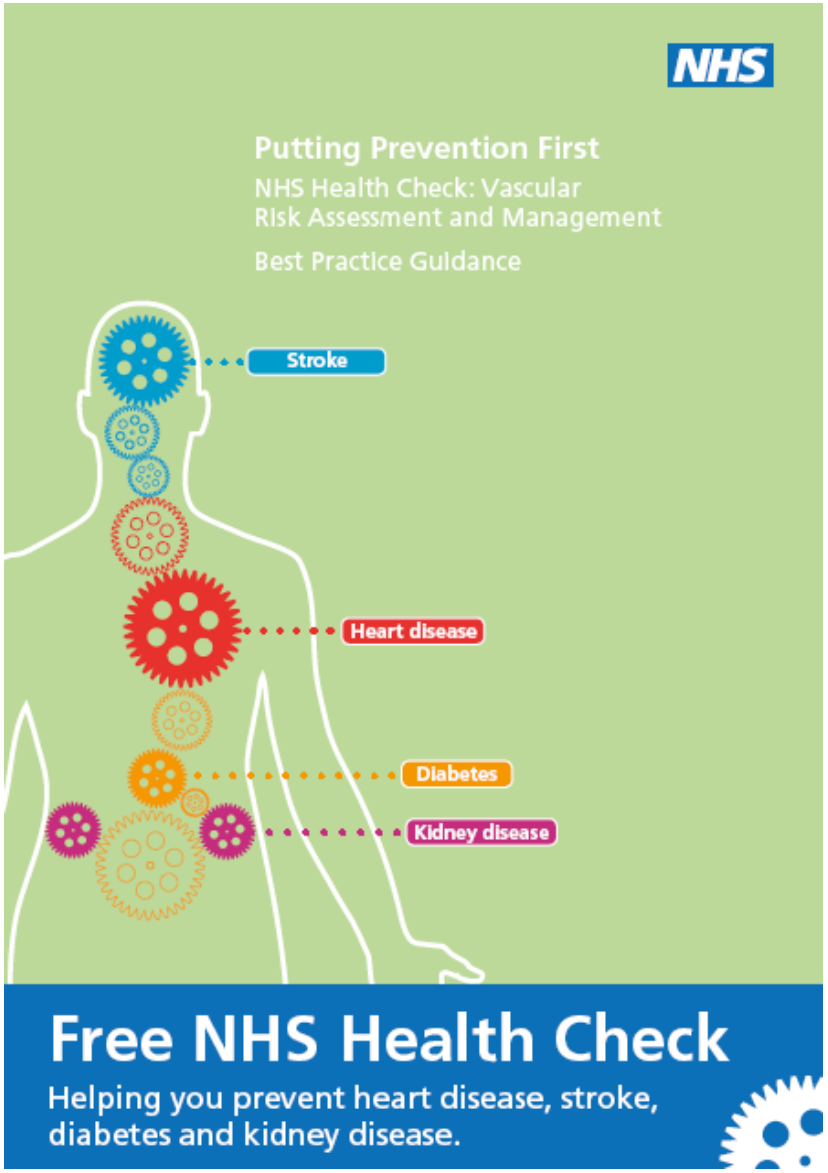
➡ Need to derive trends for insured non-smokers and smokers separately (smoking model)

Cardiovascular screening programme

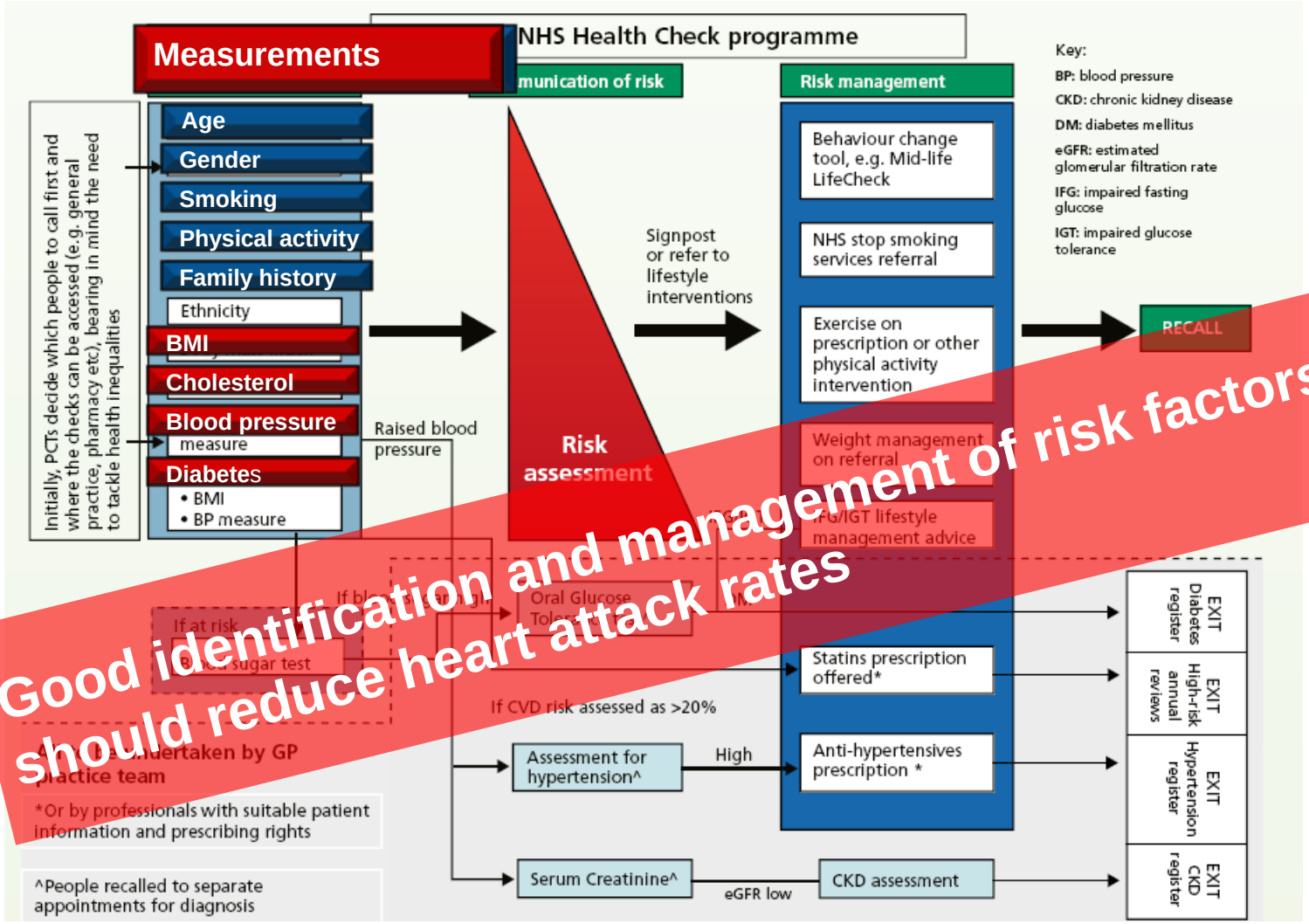
Vascular screening in the UK

- Announced 2008
- Started April 2009
- Now called *NHS Health Check*
- All aged 40 – 74
- Rolled out over 3 years

Putting prevention first – Vascular Checks: Risk assessment and management, published April 2008, DOH



NHS Health check flow chart



Good identification and management of risk factors should reduce heart attack rates

Putting prevention first – Vascular Checks: Risk assessment and management, published April 2008,DOH

Screening for cancer

Cancer screening in the UK

- FORMAL
  - Breast cancer *started 1988*
    - Mammogram every 3 years for women aged 50 to 70
    - Was 50 to 64 pre-2003 and will be extended to 47 to 73
  - Cervical cancer *started 1988*
    - Pap smear every 3 to 5 years for women aged 25 to 64
  - Bowel cancer *started 2006*
    - Faecal Occult Blood test every 3 years for men and women aged 60 to 69 (Scotland aged 50 to 69)
- INFORMAL
  - Prostate cancer
    - Digital rectal exam and/or PSA blood test

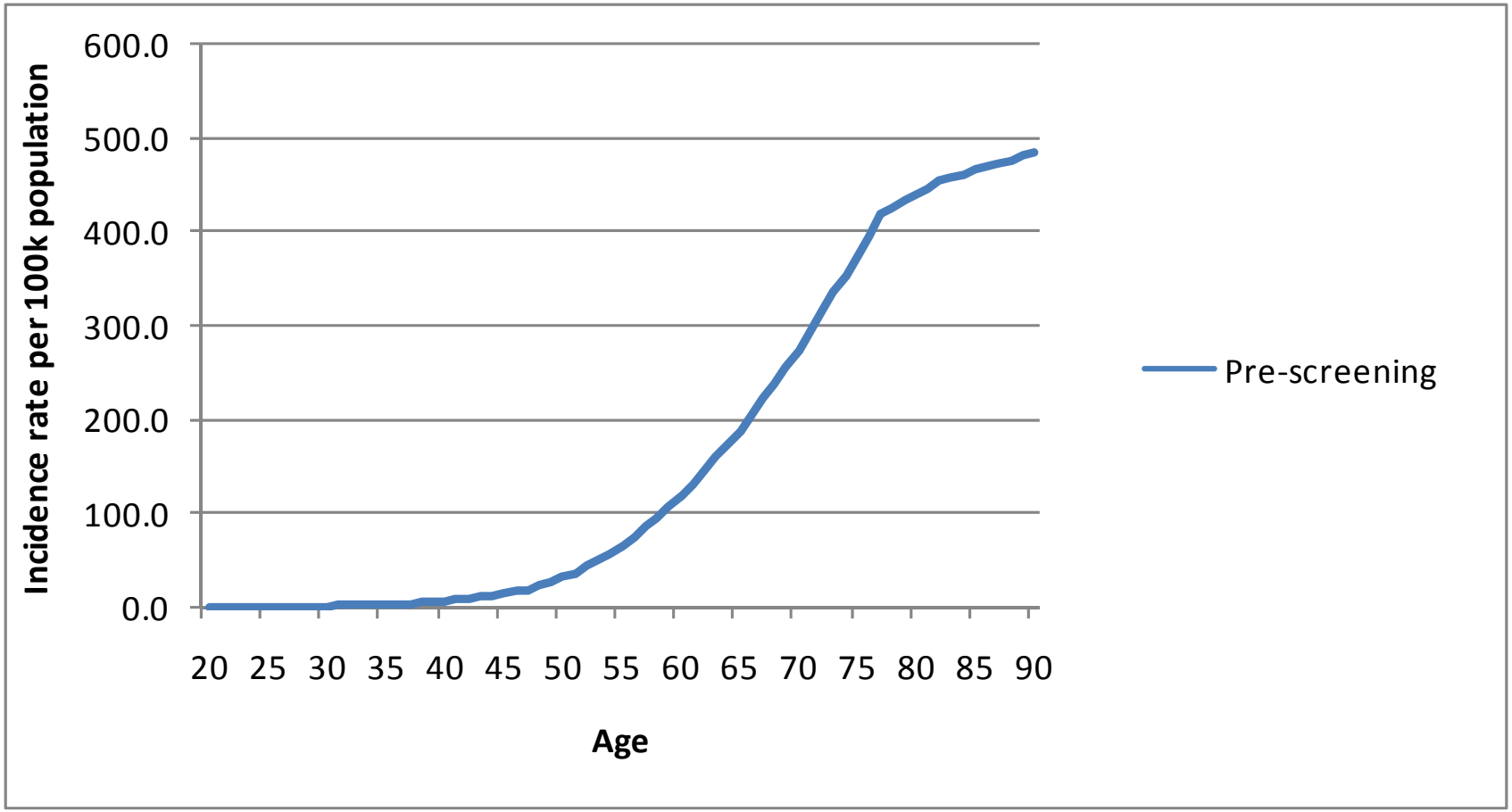
What screening does to cancer incidence

- Accelerates diagnosis of cancer
  - “lead time”
- Diagnoses more cases of cancer
  - “over-diagnosis” some of which is linked to lead time
- Possibly reduces number of cancers
  - by detecting pre-malignant tissue which can be removed
  - e.g. bowel polyps, cervical abnormalities

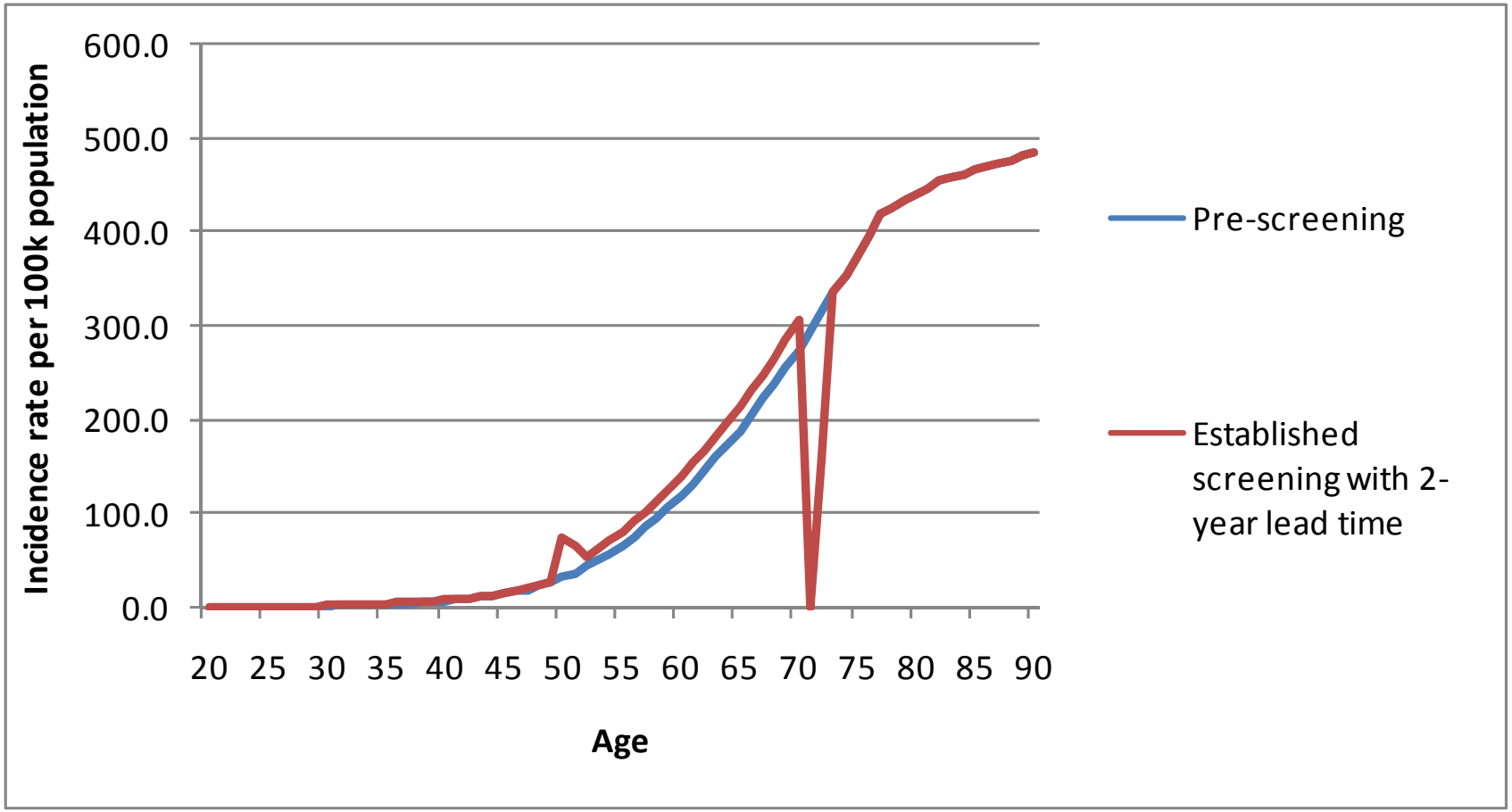
Hypothetical screening programme model

- 2-year screening cycle between ages 50 and 70
- 100% take-up rate
- 100% sensitivity in detecting cancer with a 2-year lead time
- 10% over-diagnosis rate
  - after adjusting for lead time and survival by cohort
- Preventative element ignored

Incidence shape: before screening is introduced



Incidence shape: established screening programme



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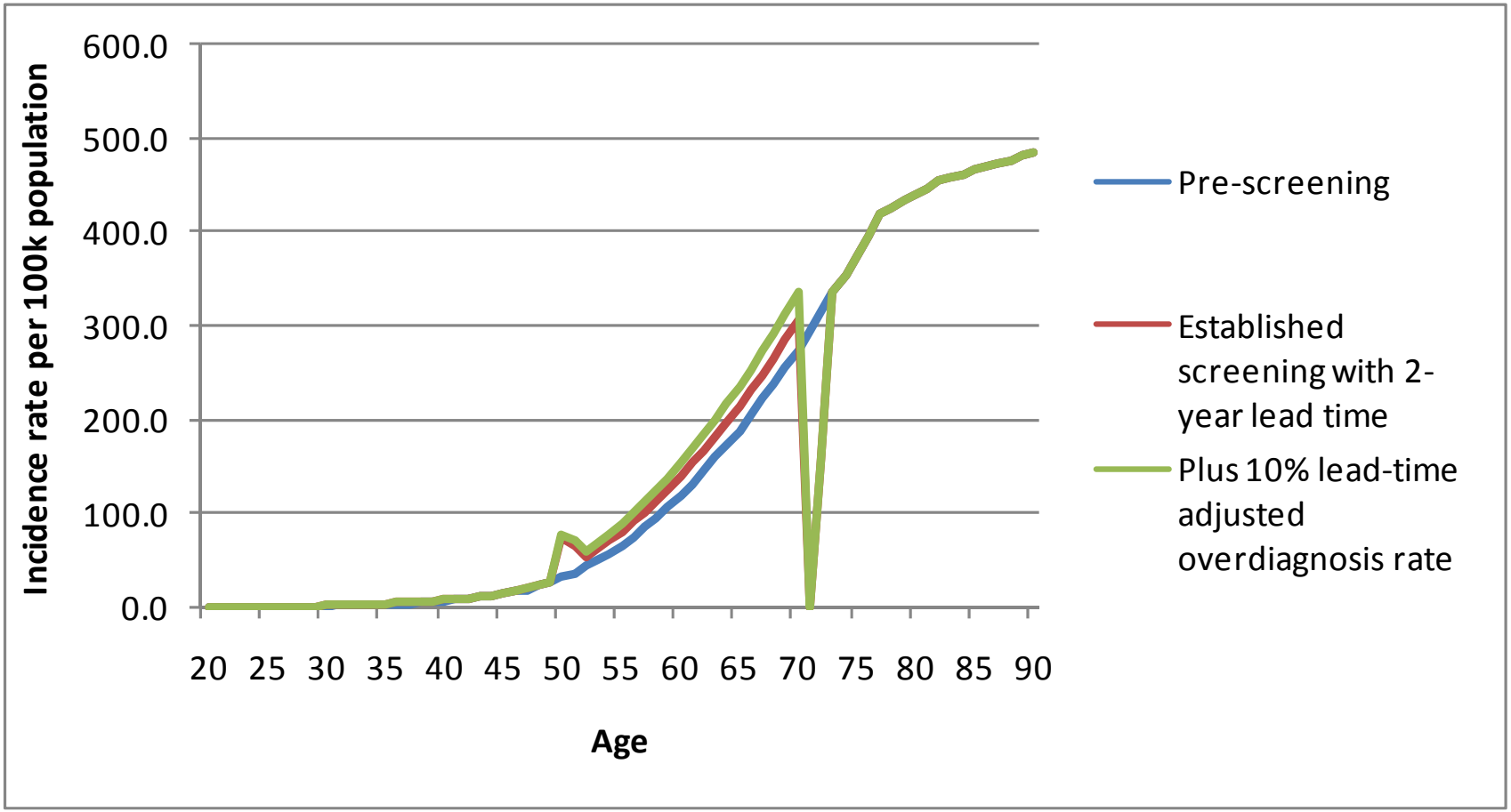
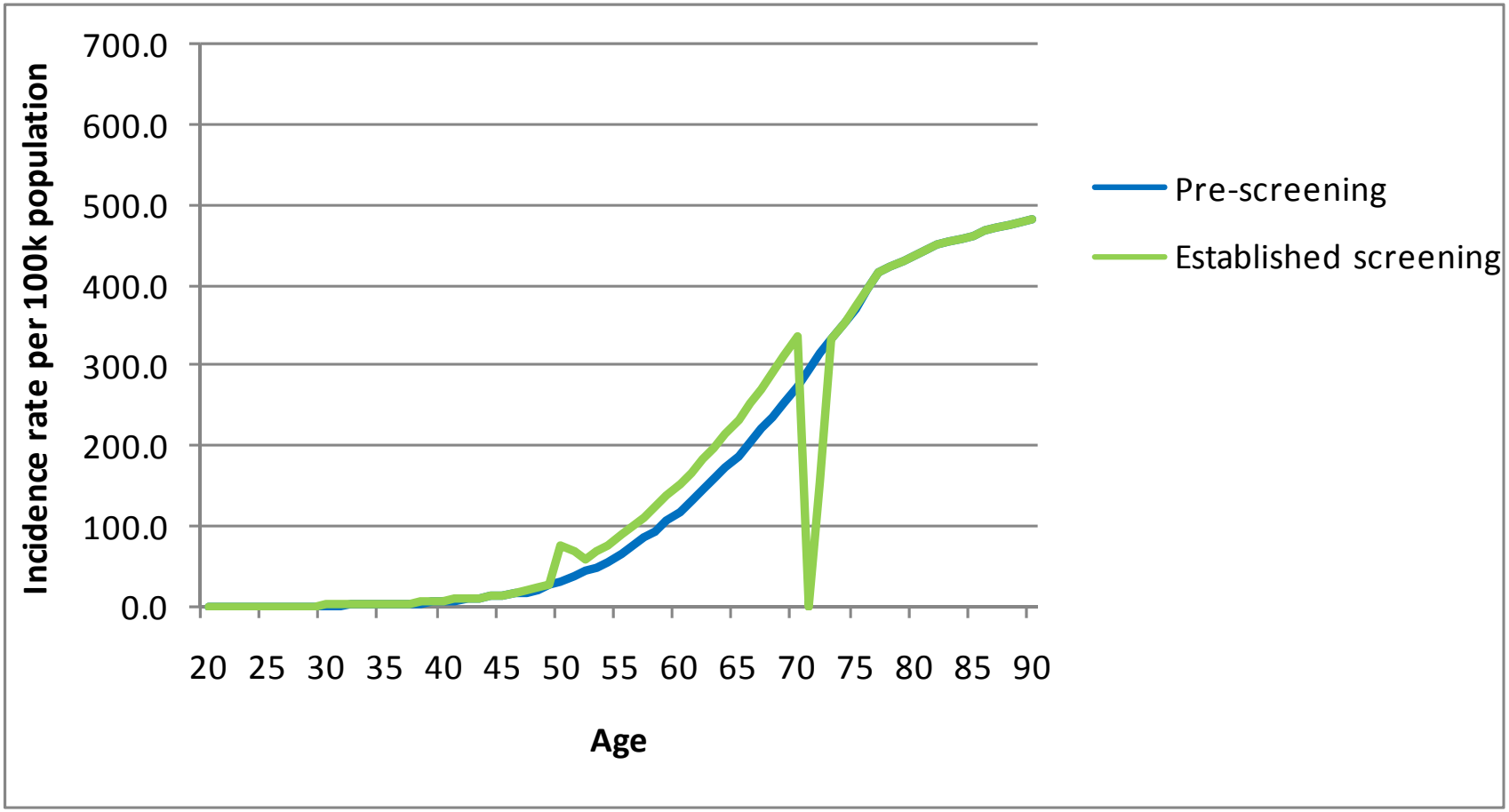


Incidence shape: “prevalent” rounds of screening programme



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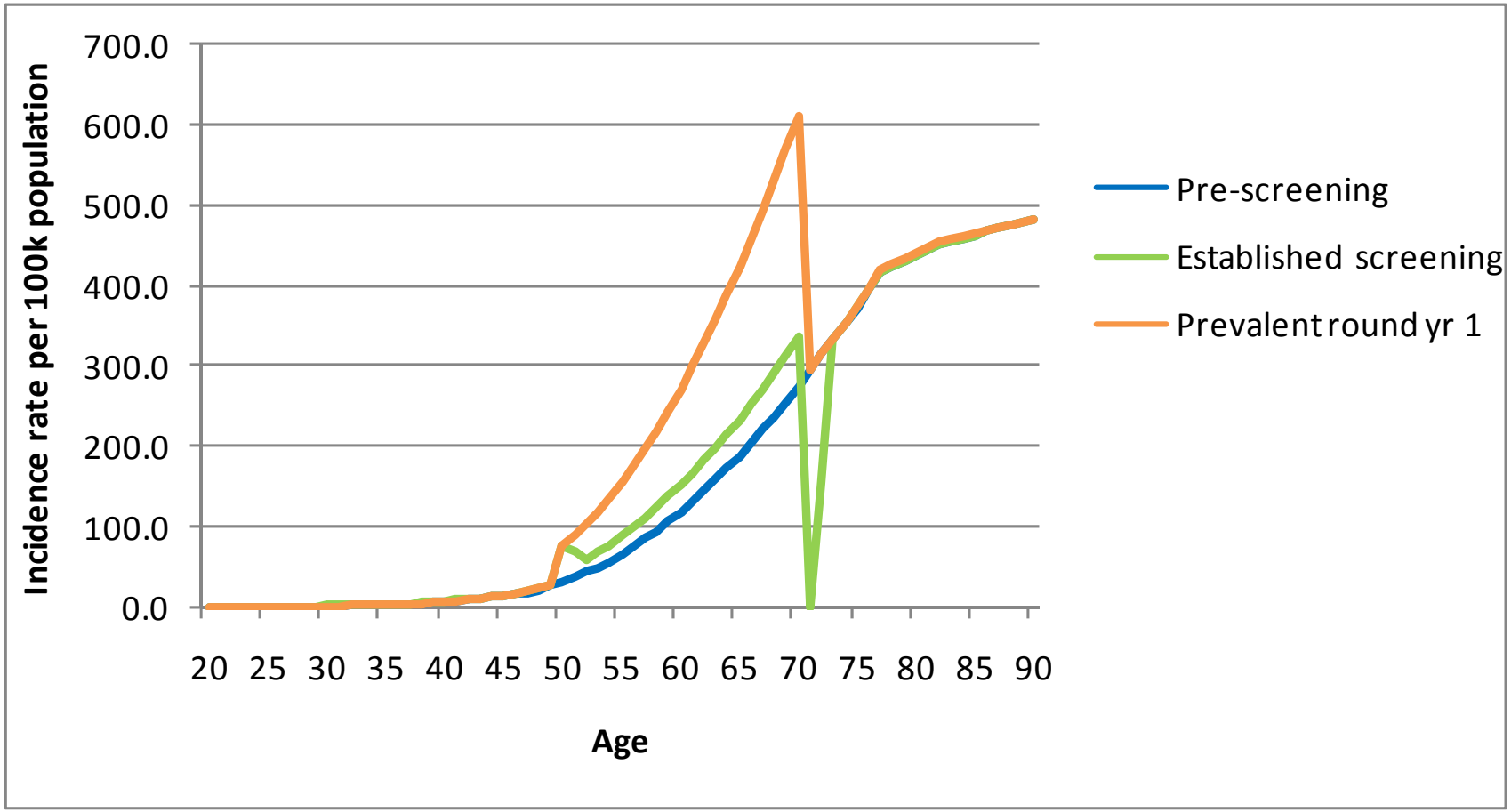

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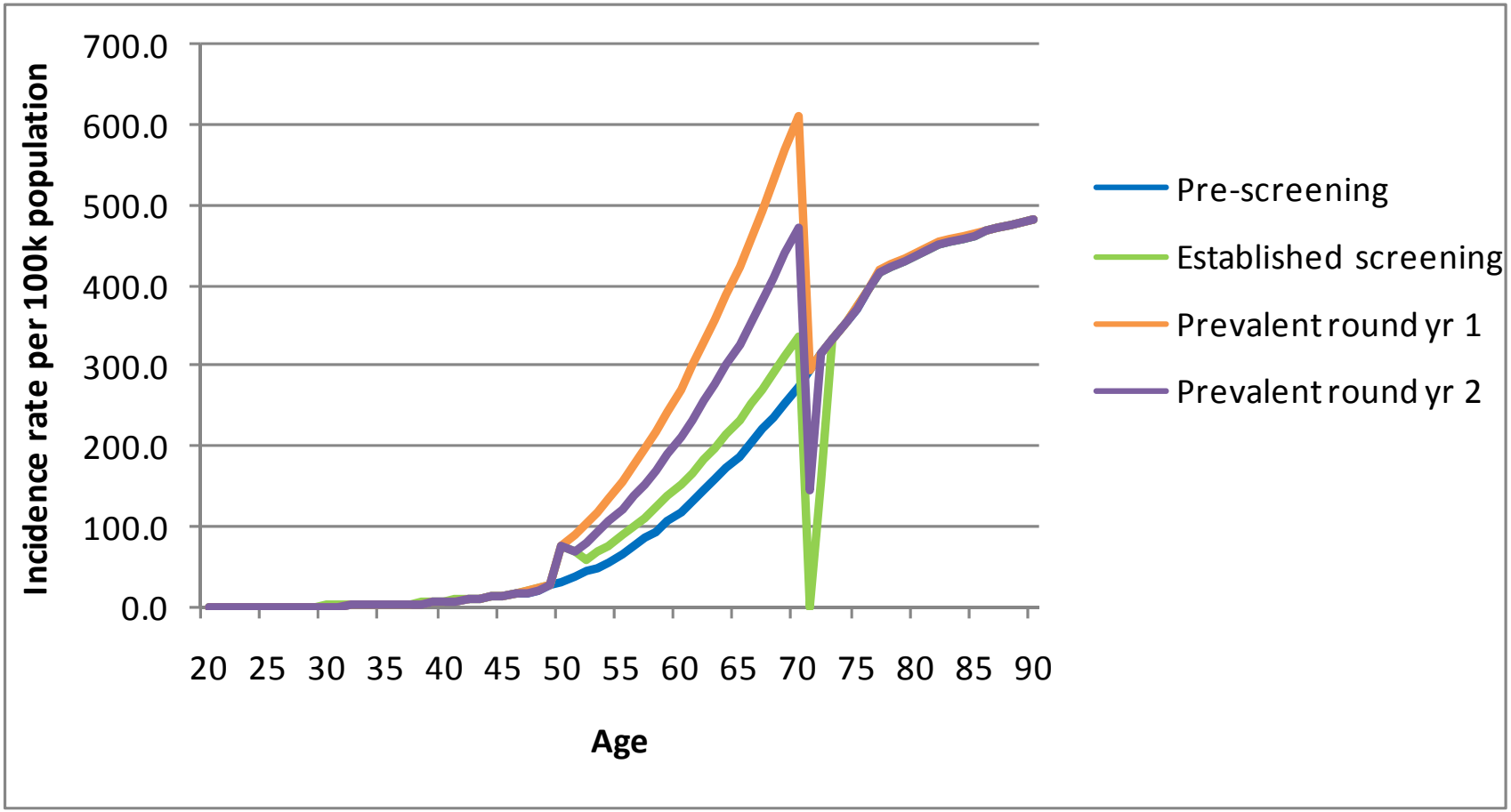
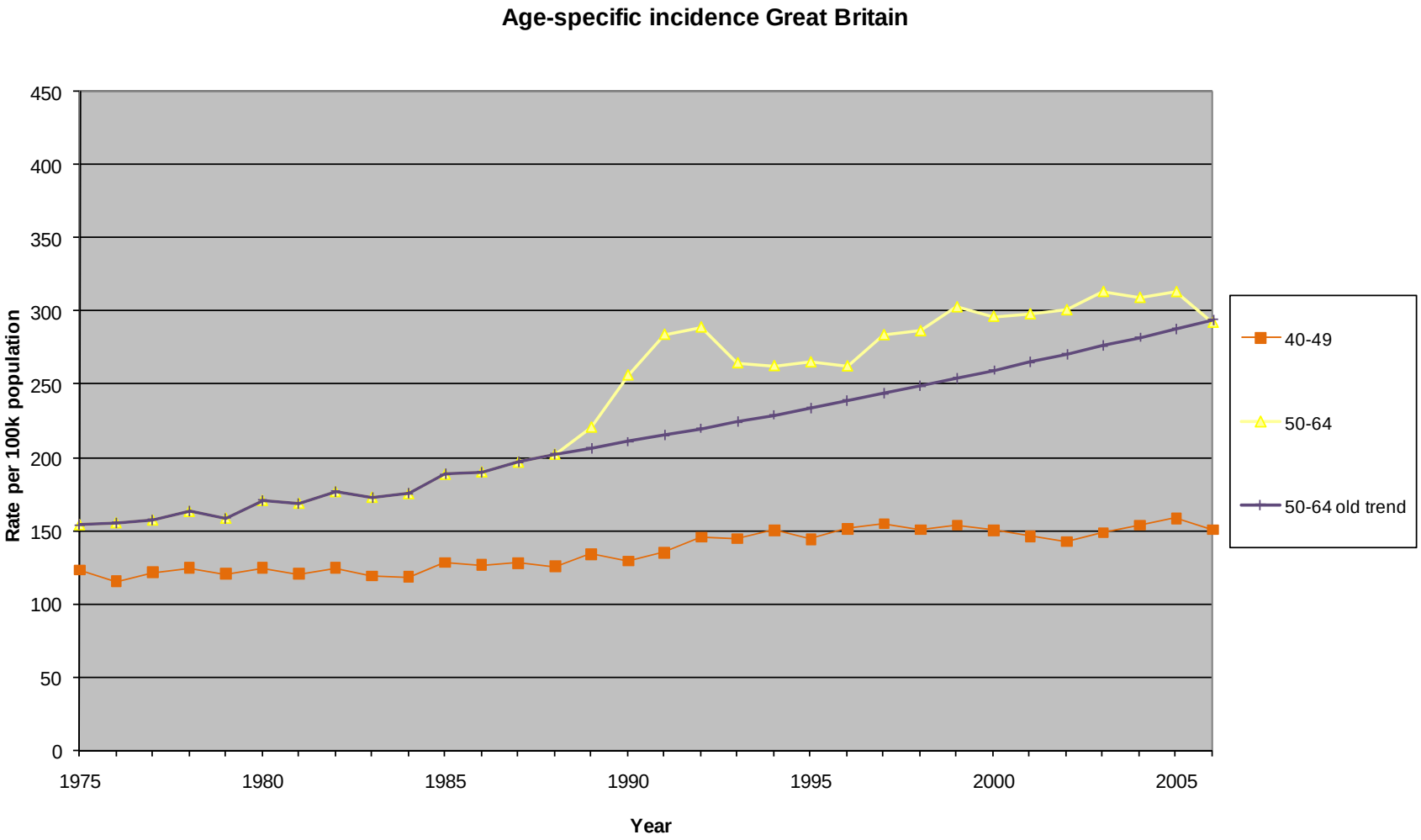


Example: Breast cancer



Source: Cancer Research UK

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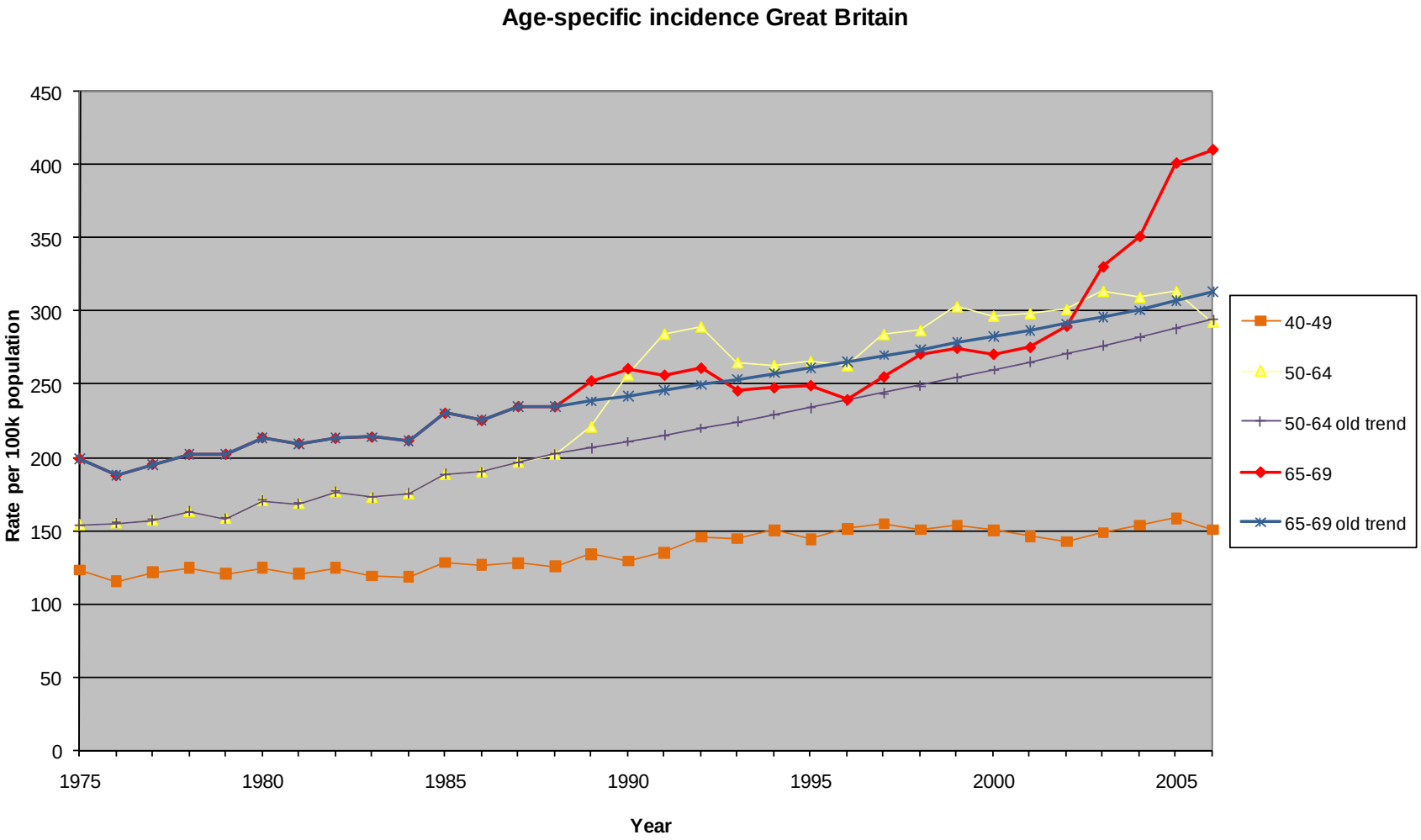

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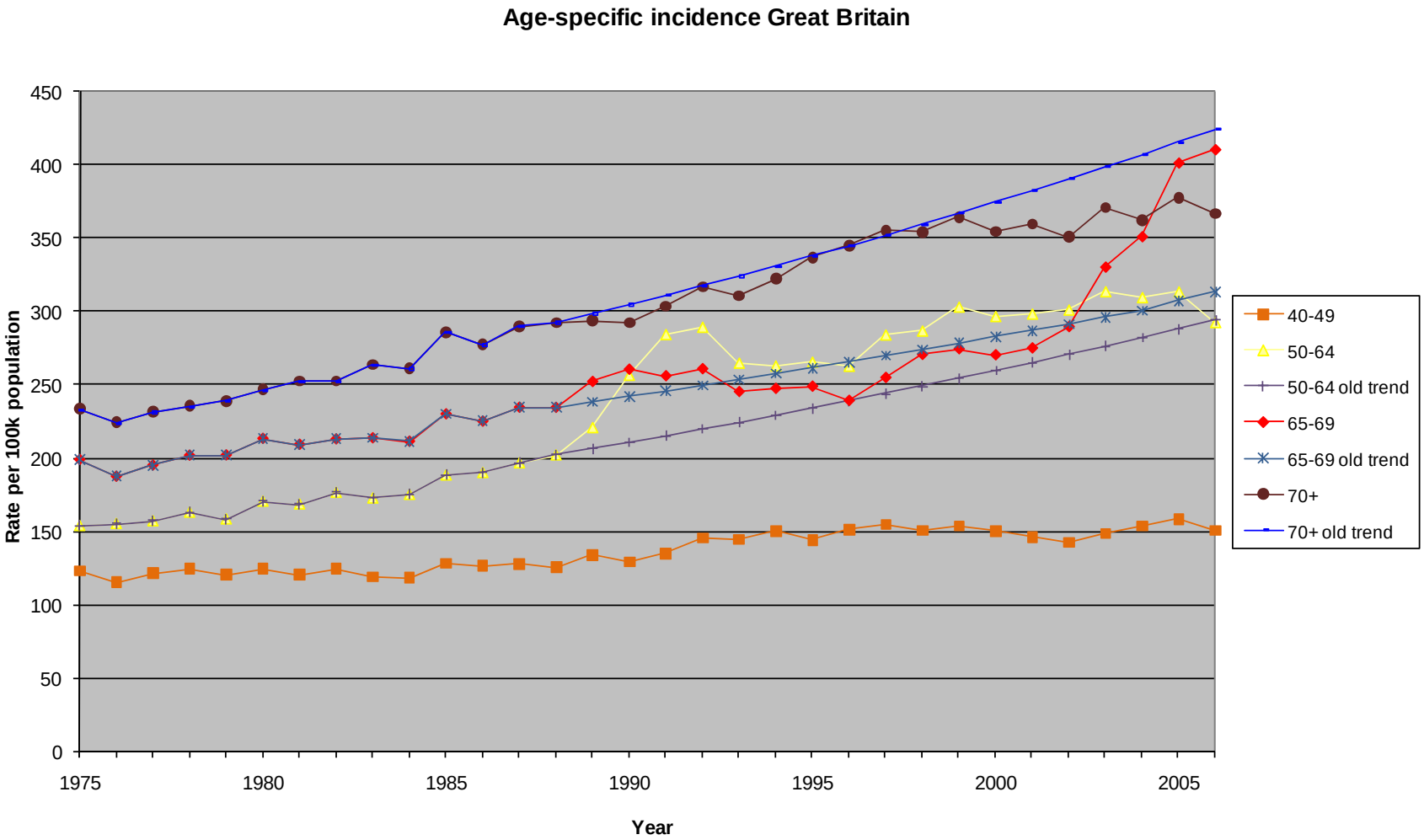

Source: Cancer Research UK

Screening models in practice: When are they used?

- Modelling changes to existing screening programmes
  - e.g. breast cancer
- Modelling introduction of new programmes
  - e.g. bowel cancer
- Modelling possible introduction of new programmes
  - e.g. prostate cancer

Conclusion

- Projection of CI trends is important
- Heart attack
  - Adjust base rate to allow for increased diagnosis using troponin
  - Future improving trend mostly because of NHS Health Check
- Cancer screening
  - Breast & Bowel cancer:

    adjustments to current and future base rates
  - Prostate cancer:

    increasing trend for informal screening

    increase to base rate for possible formal screening

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