

# Motion management in external beam radiotherapy for breast cancer patients

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# Breast Cancer

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Most common female cancer

Incidence is increasing

Survival rates vary

80% high income

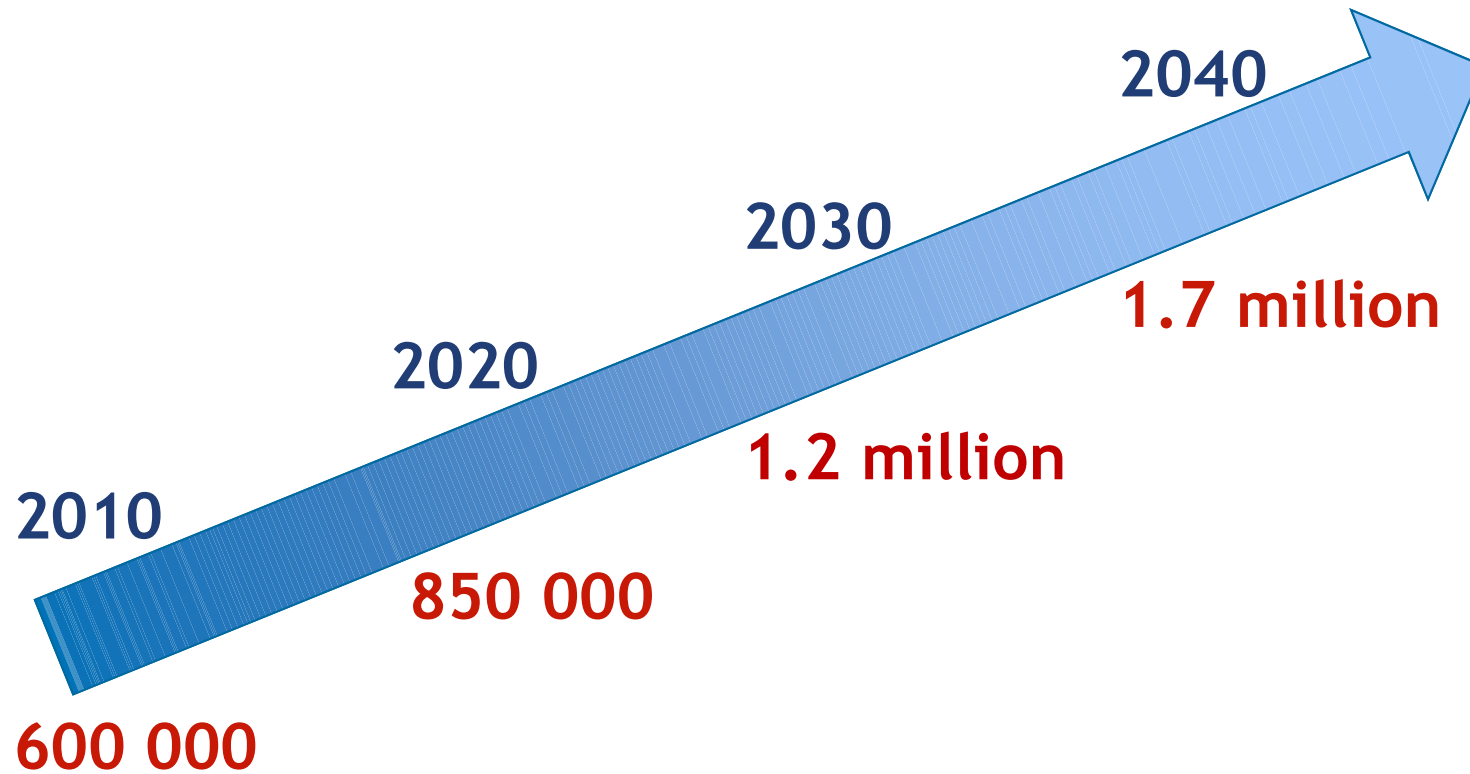
60% middle income

40% low income

Data from WHO 2017

<http://www.who.int/cancer/detection/breastcancer/en/index1.html>

# Survivorship



Maddams et al British Journal of Cancer (2012) 107, 1195-1202  
Projections of cancer prevalence in the United Kingdom, 2010-2014

# Treatment

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**Surgery**

**Radiotherapy**

**Chemotherapy**

# Benefit of radiotherapy

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Breast conservation surgery + radiotherapy

10 year risk any first recurrence 15.7%



15 year risk breast cancer death 4%



Early Breast Cancer Trialists Collaborative Group 2011 Lancet

# Motion

## Daily set-up variations

2 to 3 mm systematic and random

## Breathing

blurring

## Cardiac motion

small magnitude

high frequency

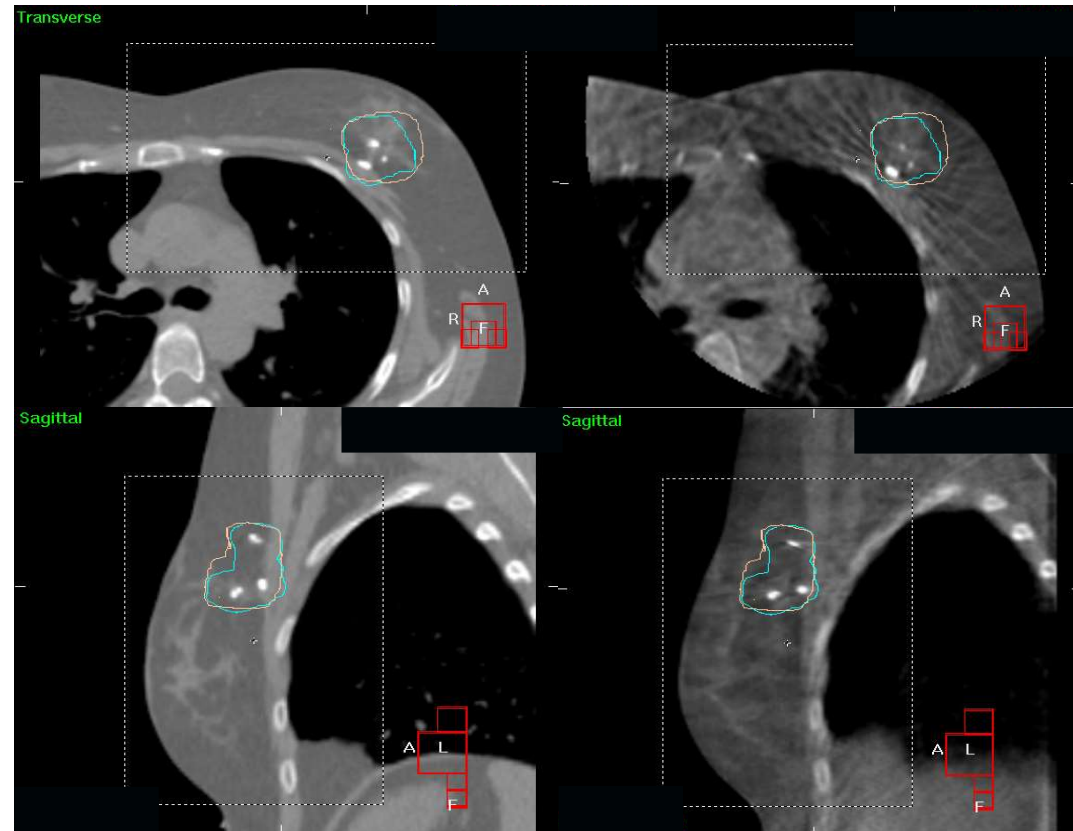


# Motion management

Imaging

Surface  
monitoring

Breathing  
control



# Normal tissues and radiotherapy



Increase in baseline risk of major coronary event increases by 7.6% per Gy

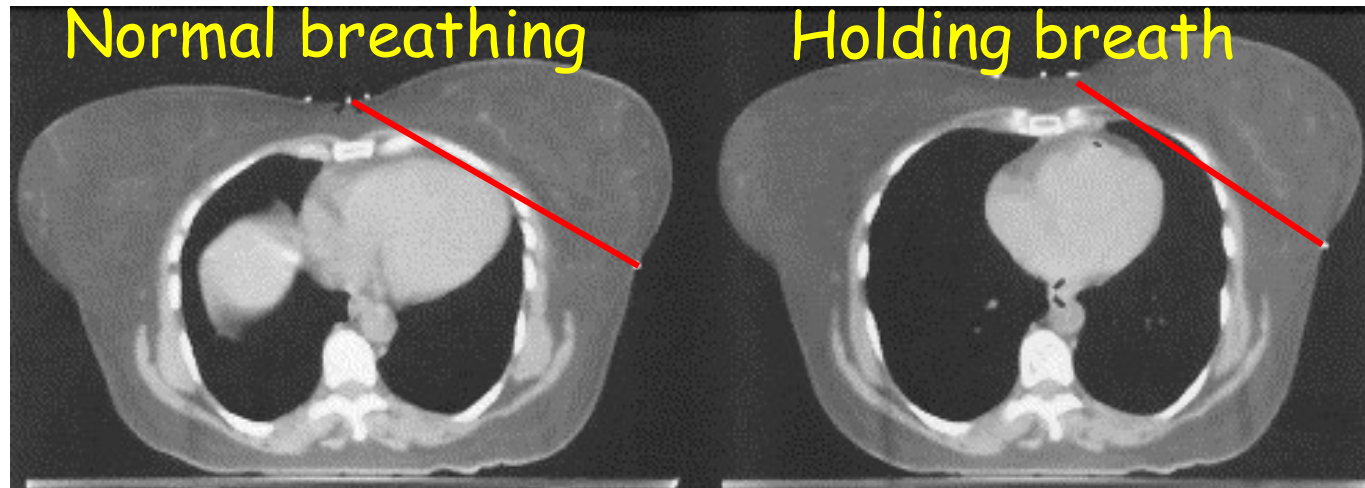
Appears linear and no threshold

Data for mean heart dose

Darby et al New England Journal of Medicine, 2013, 368 (11)  
Risk of ischemic heart disease in women after radiotherapy for breast cancer



# Breath hold studies



Images courtesy of Dr F Bartlett

Reduce heart dose

Equipment assisted or voluntary

(Open access video for voluntary breath hold technique in breast cancer radiotherapy: search 'JoVE Bartlett')

Respiratory gating

Prone positioning

# Summary

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Major female cancer

Incidence and survival increasing

Easy to implement solutions for motion  
during radiotherapy treatment

# Thank you