

An online interactive tool to improve the understanding of cancer survival statistics.

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- Cancer survival measures generally are reported as net measures, by “removing” mortality due to other causes.
- These estimates are often presented as a single average and also (age) standardized.
- These estimates are undoubtedly useful, but are perhaps overused.
- More thought should be given to the purpose and audience of cancer survival measures; this may alter what we choose to present.

What is net survival?

- Net survival measures the survival experience of patients in the hypothetical world where it is only possible to die of the cancer under study.
- It allows us to make fair comparisons between groups that have differential mortality rates due to other causes.
- It is not possible to observe the measure in the real-world where patients can die of a multitude of causes.
- We therefore use approaches in a relative survival or cause-specific survival framework to attempt to estimate net survival under certain unverifiable assumptions (synonymous with arguments and estimation in competing risks).

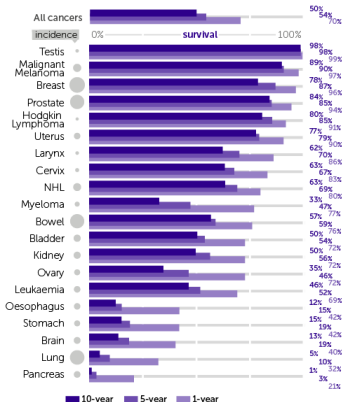
What is currently available/presented?

Cancer Research UK,

<http://www.cancerresearchuk.org/health-professional/cancer-statistics/survival/common-cancers-compared>

[Accessed 23rd May, 2017].

Age-Standardised One-, Five- and Ten-Year Net Survival, Selected Cancers, Adults (Aged 15-99), England and Wales, 2010-2011



Breast is for female only. Laryngeal is for male only.

Five- and ten-year survival for 2010-2011 is predicted using an excess hazard statistical model.

Survival for bowel cancer is a weighted average derived from data for colon (C18) and rectum cancer (C19-C20, C21.8)

Source: cruk.org/cancerstats

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Suggested style: Cancer Research UK, full URL of the page, Accessed (month) (year)

What is currently available/presented? (2)

Cancer Research UK, <http://www.cancerresearchuk.org/about-cancer/breast-cancer/survival> [Accessed 23rd May, 2017].

Survival for all stages of breast cancer

Generally for women with breast cancer in England and Wales

- Around 95 out of every 100 women (around 95%) survive their cancer for 1 year or more after diagnosis
- Almost 90 out of every 100 women (almost 90%) will survive their cancer for 5 years or more after diagnosis
- Almost 80 out of every 100 women (almost 80%) will survive their cancer for 10 years or more after diagnosis
- Around 65 out of every 100 women (around 65%) are expected to survive their cancer for more than 20 years after diagnosis

— Where this information comes from

Statistics provided by the Statistical Information Team at Cancer Research UK.
From The National Cancer Registration and Analysis Service

“80 out of 100 women will survive their cancer for 10 years or more.”

- This does not mean that 80 out of 100 will still be alive.
- It is the average net survival, i.e. if it were impossible for women diagnosed with breast cancer to die from anything other than their breast cancer.
- It is an average and so does not reflect the variation in net survival by age.
- As it is age-standardized it reflects this average for a different age distribution to that actually observed in the cohort.

- Crude probabilities allow us to report real world chances of being alive or dead.
- They partition the all-cause probability of death into deaths due to cancer and deaths due to other causes.
- They may be more relevant to patients/health care professionals.
- It is possible to estimate both net survival and crude probabilities from lifetables and statistical models.

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- Firstly, we can create more individualised predictions by using statistical models; even by using only the most basic covariate information such as age, sex, deprivation, stage etc.
- Secondly, we can present real-world estimates as well as net measures, so that people can appreciate the true risk of being alive X years down the line following a diagnosis of cancer.
- Finally, we can also consider using different metrics and methods of presentation in order to make the information easier to understand and interpret.




<https://interpret.le.ac.uk/> [Accessed 23rd May, 2017].

65 Yr Old Female Patient Diagnosed with Colon Cancer

Likely Cause of Death years from Diagnosis



People Key

-  - Likely to have Died from Cancer
-  - Likely to have Died from Other Causes
-  - Alive

Text Interpretation Probability tables

All Cause Survival Expected Survival Net Survival Crude Probability of Death (CPD)

All Cause Survival

This is also known as "observed" survival where death can be from any cause, including the cancer itself. It gives the chance of being alive at different points in time after

Graph Options

Choose cancer site:
Colon

I want probabilities in terms of:
Mortality

Age: 65 yrs

40 50 60 70 80 90

Male
 Female

CPD due to All Causes
 CPD due to Other Causes
 CPD due to Cancer
 1+ Net Survival

Select chart type:
People Chart

- We fit a flexible parametric relative survival model.
 - Using splines to model underlying baseline excess mortality rate.
 - We allow survival to vary by continuous age and be non-linear (using splines).
 - We allow for non-proportional excess hazards
 - We fit separate models by sex.
 - We use period analysis: window 01/01/2013 to 31/12/2015.

The online tool (programmed by Sarwar Islam)

- The tool is developed using the D3 JavaScript package.
- Parameter estimates are exported from Stata
 - no individual level data stored online
- For any age/sex we can predict,
 - Net probabilities.
 - Crude probabilities (line and stacked charts)
 - Various other measures (to be added).
- Results are displayed using
 - Line charts / Stacked Charts
 - People charts
 - Tables
 - Simple text descriptions (natural frequencies).
- All these are updated instantaneously as the user move drag bars or uses drop down menus or radio buttons.

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Show Interpret

Summary

- Cancer survival measures can be difficult to understand
- Interactivity help improve understanding.
- Net survival is extremely useful, but additional measures help us understand the real world impact.
- We are all different - good to present information in different ways (graphs/tables/text).
- Various Extensions
 - Key extension is more disease information (stage, grade, nodes).
 - Add more cancer sites.
 - Add more measures (e.g. loss in expectation of life).

Try Yourself!!

interpret.le.ac.uk