

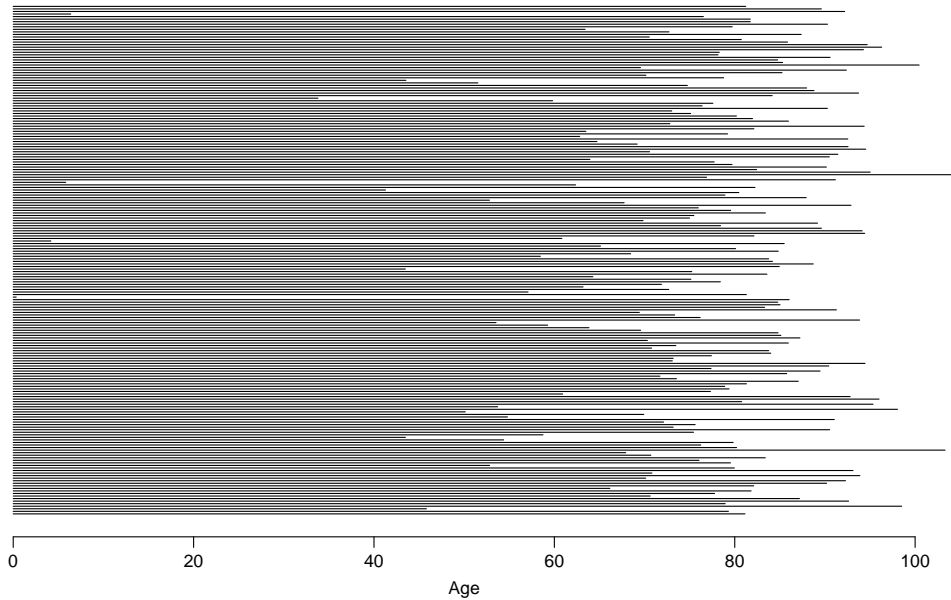
Median survival and mean survival

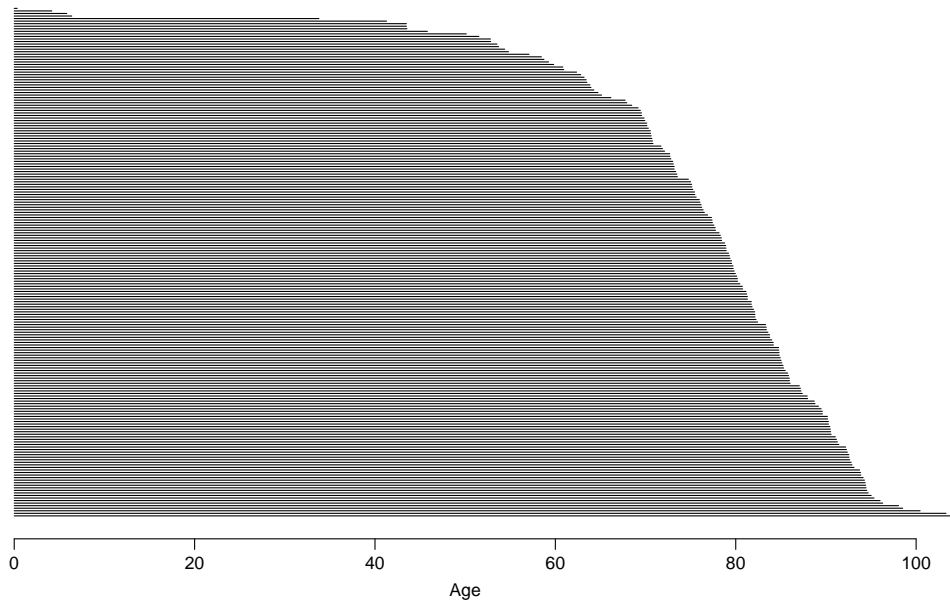
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Expected life time

- ▶ Take, say 200, persons
- ▶ follow till all are dead
- ▶ compute the mean age at death (life time)
- ▶ — that is the **life expectancy** (at birth)
- ▶ ...so let's do it and see how it works



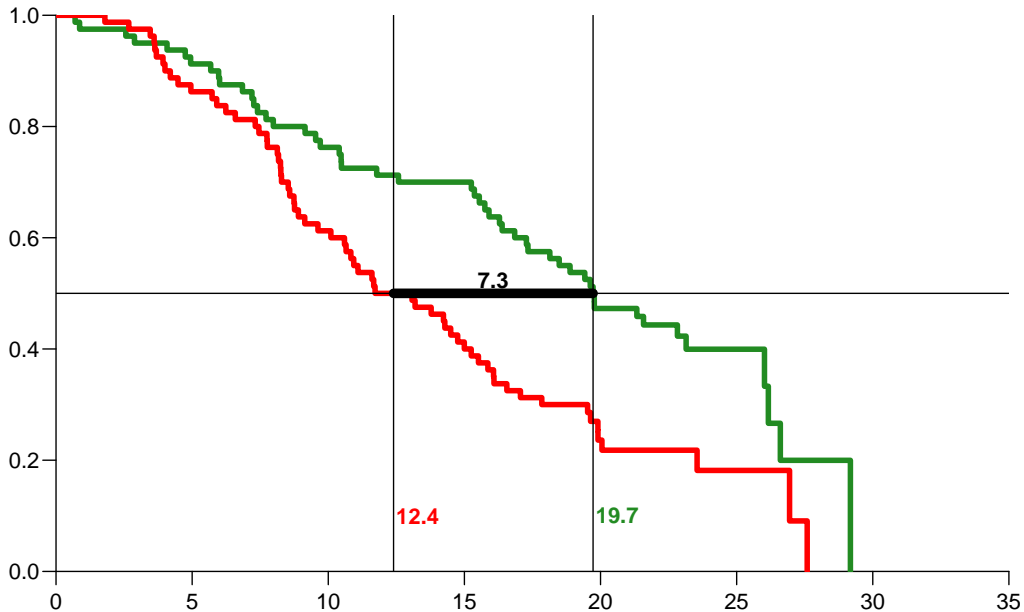


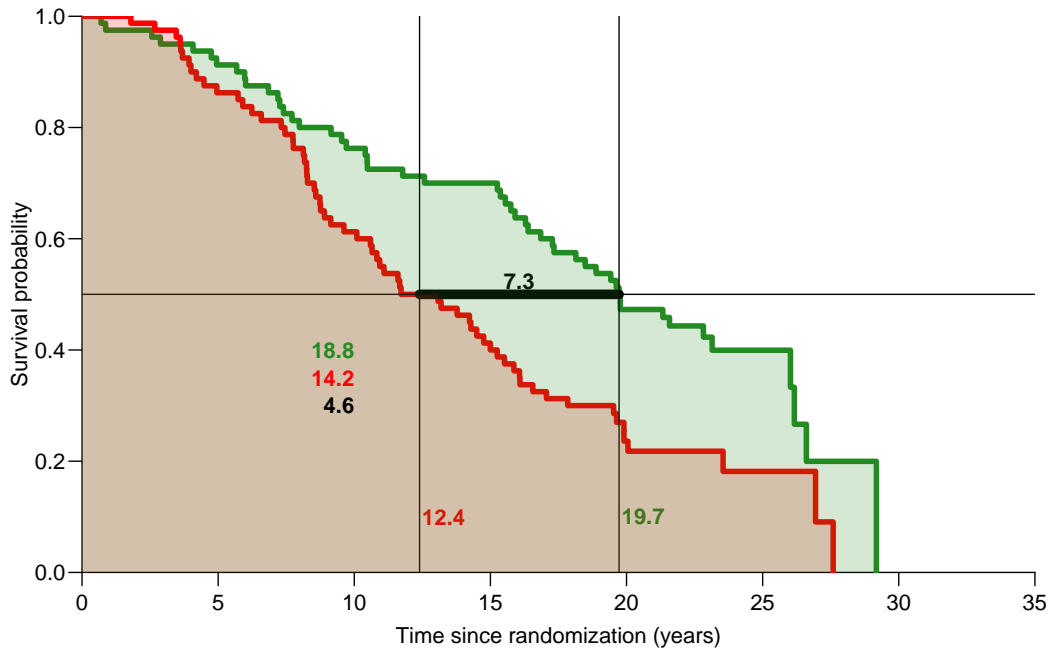
Expected life time and years lost

- ▶ **ERL** (**E**xpected **R**esidual **L**ifetime):
Area under the survival curve
- ▶ **YLL** (**Y**ears of **L**ife **L**ost) (to diabetes):
 $ERL_{pop} - ERL_{DM}$
- ▶ **difference** between areas under the survival curves
- ▶ \Rightarrow area **between** the curves
- ▶ ... all the way till all are dead

Years gained by treatment

- ▶ The same as years lost
- ▶ ...just compared the other way round
- ▶ between treated and placebo (reference treatment)
- ▶ difference in **mean** (expected) lifetime
- ▶ but why not instead use differences in **median** survival time ?

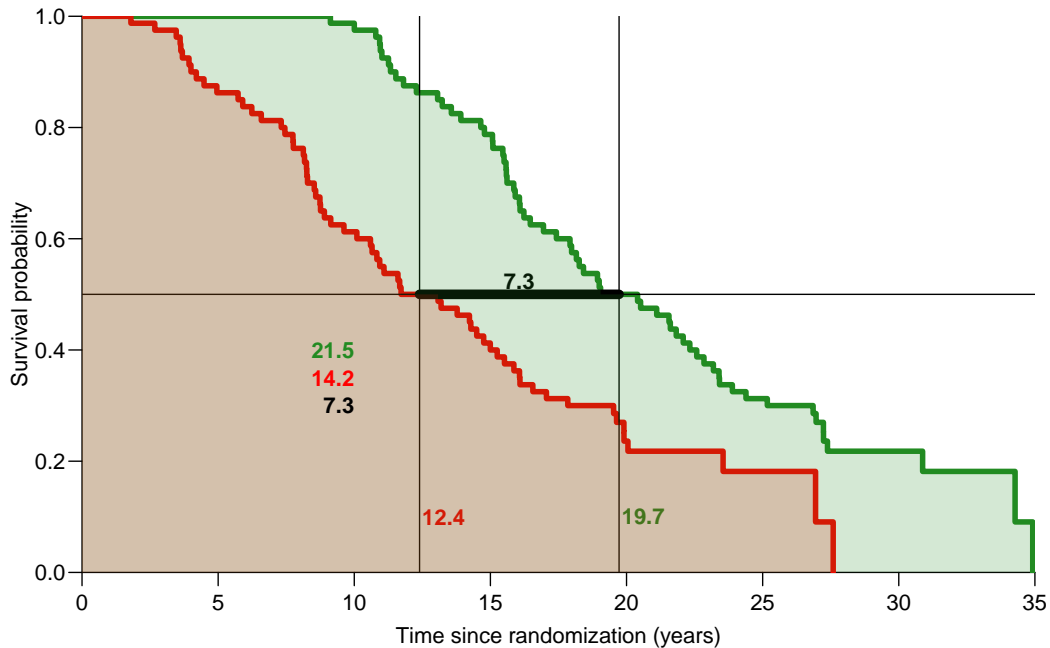




Years gained by treatment

- ▶ The difference in **median** survival is (much) larger than the differences in **mean** survival time.
- ▶ One instance where the differences in median and the mean difference equal is if
- ▶ survival curves are **parallel**
- ▶ Unlikely scenario
 - effectively claims the same life prolongation for all
- ▶ Unlikely because:

$$\text{median}(\text{diff}) \neq \text{diff}(\text{median})$$



Years gained: median vs mean

- ▶ Unlikely that differences in mean and median equal:

$$\text{median}(\text{diff}) \neq \text{diff}(\text{median})$$

- ▶ Note that the l.h.s. requires contrafactuals
- ▶ — namely the knowledge of each person's life length **both** treated and un-treated.
- ▶ What can be (*i.e.* is normally) computed is $\text{diff}(\text{median})$
- ▶ ... but quite many persons will perceive it as $\text{median}(\text{diff})$
- ▶ No such problems with the mean, because:

$$\text{mean}(\text{diff}) = \text{diff}(\text{mean})$$

- ▶ **Conclusion:**

It is preferable to use the **mean** difference in lifetimes

