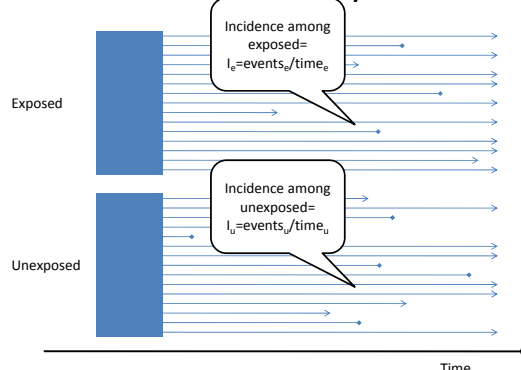


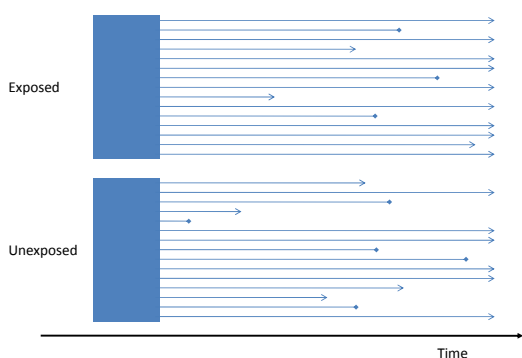
## Advanced sampling in case-control studies

Gustaf Edgren, PhD

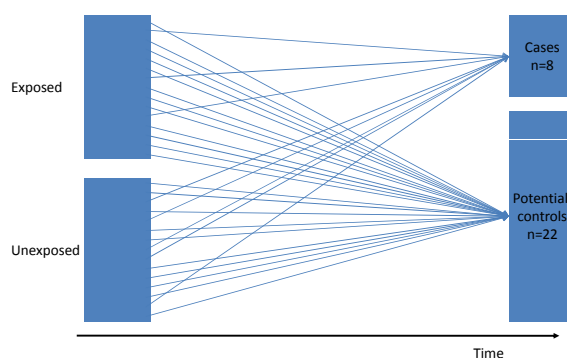
### Cohort study



### Traditional case-control study



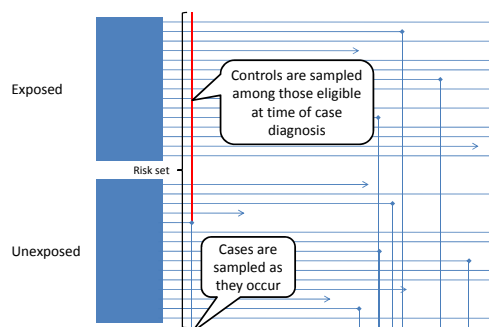
### Traditional case-control study



### Traditional case-control study

- Unless performed "online" (as cases accrue) will only sample from cases that had the longest survival
- Similarly, controls will only be available if alive at end of follow-up period
- Is therefore susceptible to duration bias (a sort of selection bias)
- Also, requires the rare-disease assumption

### Modern case-control studies



### Incidence density sampling

- A new sampling system for case-control studies
- Controls are sampled among those who “are at risk of the outcome at the time of the diagnosis of the case” i.e. in the risk set
- The purpose is: To ensure that “the probability of being sampled as a control is directly proportional to time at risk”

### Incidence density sampling

- Why ensure that “the probability of being sampled as a control is directly proportional to time at risk?”

$$\begin{aligned}
 OR &= \frac{a/b}{c/d} = \frac{a/c}{b/d} = \\
 &= \frac{\text{events}_e / N(\text{controls}) \times P(\text{exposed} | \text{control})}{\text{events}_u / N(\text{controls}) \times P(\text{unexposed} | \text{control})} = \\
 &= \frac{\text{events}_e / P(\text{exposed} | \text{control})}{\text{events}_u / P(\text{unexposed} | \text{control})} = ?
 \end{aligned}$$