## Reuse of controls from nested case-control designs

In epidemiological research it is common to follow large cohorts over time with respect to exposure and outcome development. This can be expensive and time consuming, and a much used alternative is the nested case-control (NCC) design (incidence density sampling). With this design, *m* controls are sampled for each case. The controls are required to be event free at the *time* the case experienced the event and they are often also matched on additional background factors for instance sex, year of birth or county of residence.

Due to this matching it has traditionally been considered impossible to reuse the controls for other endpoints, i.e. use the controls for other cases than they originally were sampled for. However, Samuelsen(1997) introduced a method for breaking the matching which permits reuse of controls. This method involves weighting the likelihood contributions with inverse sampling probabilities. These sampling probabilities must be estimated from the data and I will discuss different weight estimators, and show how they should be modified to allow for left-truncation and additional matching.

Simulations and analysis of prostate cancer data are used to show how inverse probability weighting can enable more efficient use of the sampled data, which result in higher efficiency and lower standard errors.