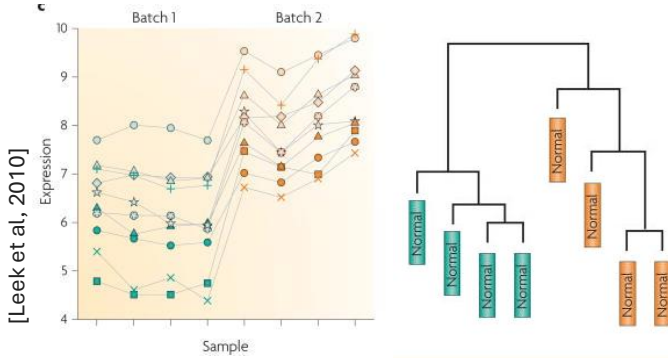


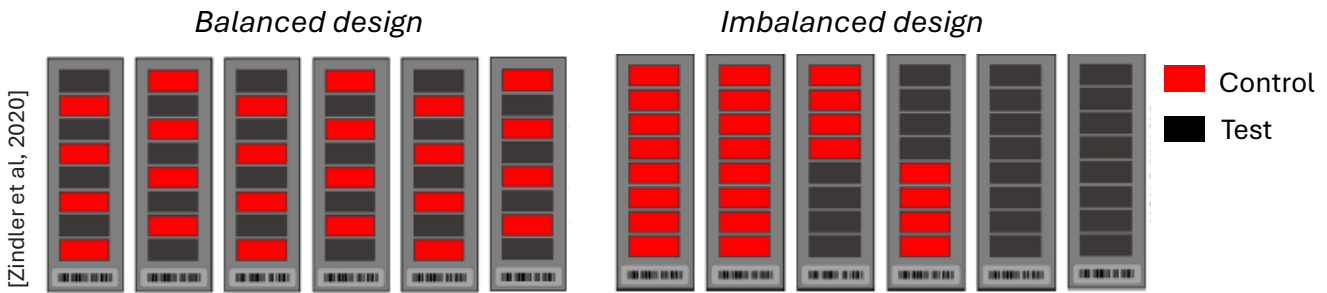
## Batch effects



Batch effects are variations caused by technical variability due to the time, place, and materials used. E.g. Pamchips, runs.

Same samples, different expression level

## Balanced design: batch effects are not confounded with real



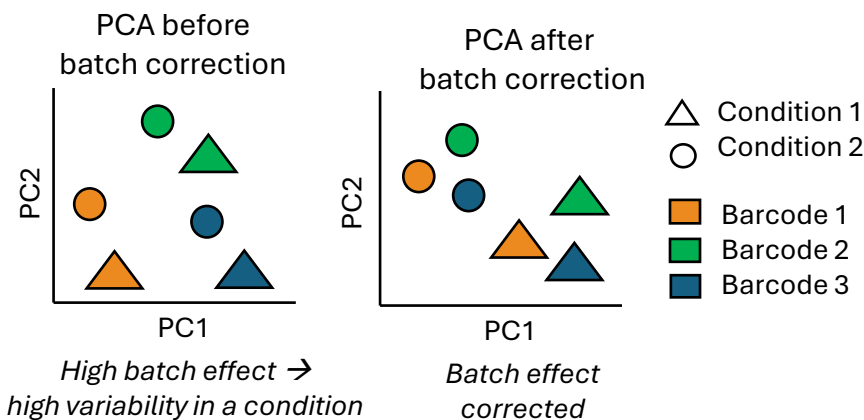
Conditions are balanced over batches.

Conditions are in different batches.

Batch effects can confound real effects if the design is imbalanced. This can lead to false results.

We aim to do balanced design to avoid confounding batch effects with the real effects (biological difference between test conditions).

## Balanced design: batch effects can be corrected



High batch effect → high variability in a condition

Batch effect corrected

Batch effects lead to high variability within a condition. Before Upstream Kinase Analysis (UKA), batch effects can be corrected if the design is balanced. This leads to decrease of variability thus makes UKA more powerful.