CASE STUDY 4 (Stekel, 2003)

EXAMPLE 10.4 TIME SERIES

Budding yeast can reproduce sexually by producing haploid cells through a process called sporulation. Yeast was placed in a sporulating medium and samples were taken at seven time points from the start of sporulation. We are interested in identifying genes that show similar profiles in the timecourse.

Experimental Design 1

The samples from the seven time points are hybridised to seven Affymetrix arrays (Figure 10.4a).

Experimental Design 2

The samples from the six time points after time zero are prepared and labelled with Cy3. A larger sample from the time zero time point is prepared and labelled with Cy5 as a reference sample.[1] The samples are hybridised to six arrays, with each time point in the Cy3 channel and the time zero sample in the Cy5 channel (Figure 10.4b).

Experimental Design 3

The samples from the seven time points are each labelled twice: once with Cy3 and once with Cy5. The arrays are hybridized to seven arrays as shown in Figure 10.4c. This is known as a **loop** design.

[1] Early time-course experiments used the sample at time zero as a reference sample. More recently, researchers are employing the better practice of using a mixture of sample from all time points as a common reference sample. This has the advantage of ensuring that there is signal in the reference sample from all genes that are expressed at some point during the time course.

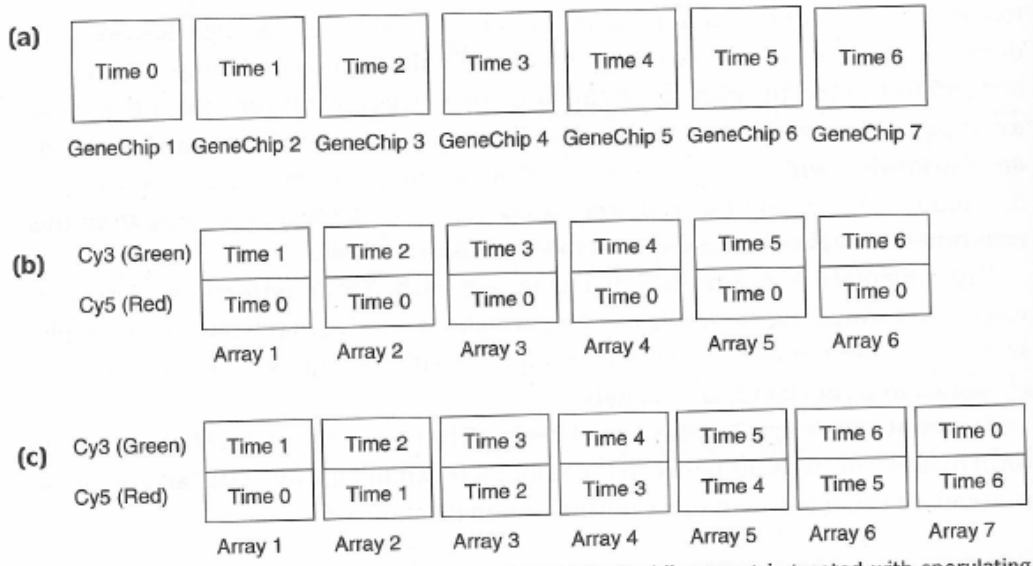

Figure 10.4: Experimental design for time series study. Budding yeast is treated with sporulating medium; samples are taken at seven different time points and hybridised to microarrays. There are three common experimental designs: **(a)** Samples from each time point are hybridised to seven different Affymetrix GeneChips. **(b)** The sample from time zero is used as a reference sample, labelled with Cy5 and hybridised to all arrays. Samples from the other six time points are labelled with Cy3 and hybridised to six different two-colour arrays. **(c)** Samples from all seven time points are labelled twice: once with Cy3 and once with Cy5. These are hybridised to the arrays in the pattern shown. This is known as a loop design.