BBSI: Fundamentals of Microarrays

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Problem Set 1

You have discovered a new species of primates, *wookie starwarius*. This species is prone to extreme hair growth and you want to study the mechanisms of this in the hope of discovering a new treatment for baldness in humans. After reading several reviews on DNA microarray technology, you decide that performing microarray studies on skin biopsies from *wookie starwarius* would be your method of choice for this work. However, these studies pose certain technical and theoretical problems:

1) Being a new species, *wookie starwarius* gene structure and expression has not been studied at all. How would you propose conducting microarray studies on a new primate species? Name two alternate approaches.

2) Describe the pros and cons of using spotted cDNA arrays vs. short oligonucleotide microarrays for your studies on *wookie starwarius*.

3) The goal of these studies is to identify gene expression patterns that might be relevant for treatment of human baldness. How will you use expression data on tens of thousands of genes to identify candidate genes relevant to treating baldness? Describe the experimental design best suited to answer the question. How will you confirm your candidates?

4) Assume that you have sequenced one gene in *wookie starwarius* and it is identical to a mouse gene for protein kinase C, epsilon. Discuss how you would design probe(s) for microarray studies on PKC epsilon – both spotted cDNA and short oligonucleotide arrays. Hint: start by searching for cDNA sequence for the mouse PKC epsilon gene (gene id: prkce) at the UniGene database from NCBI --
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=unigene.