Microarrays

Functional genomic data analysis: transcriptomics





Nucleic acid hybridization



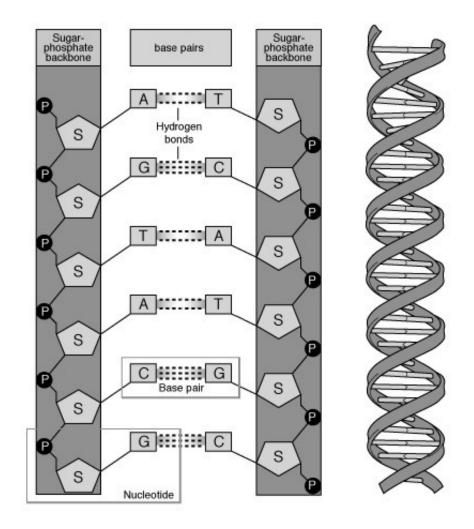


Two complementary sequences can hybridized together.

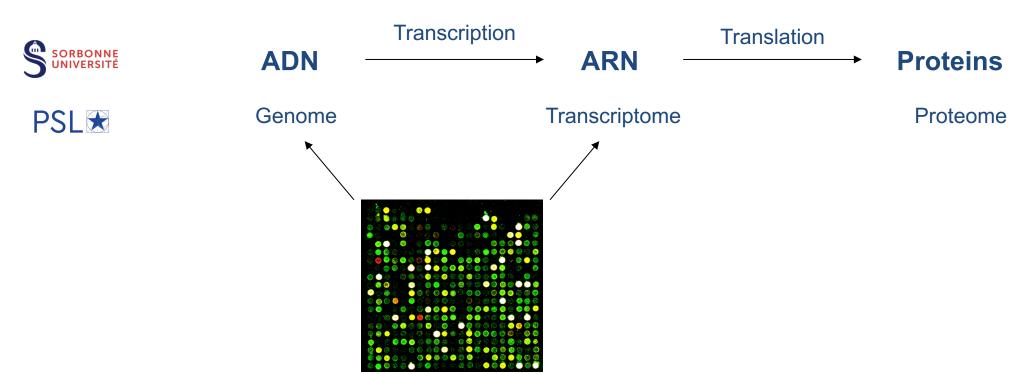
Hybridization is influences by several parameters:

- Specificity (cross-hybridization)
- Sensitivity (Tm, secondary structure, ...)
- Sequences (size, base composition)

Some parameters can be controlled by hybridization buffer stringency (temperature, salt concentration and H bond destabilizing agent like formamide).



The molecular biology central dogma

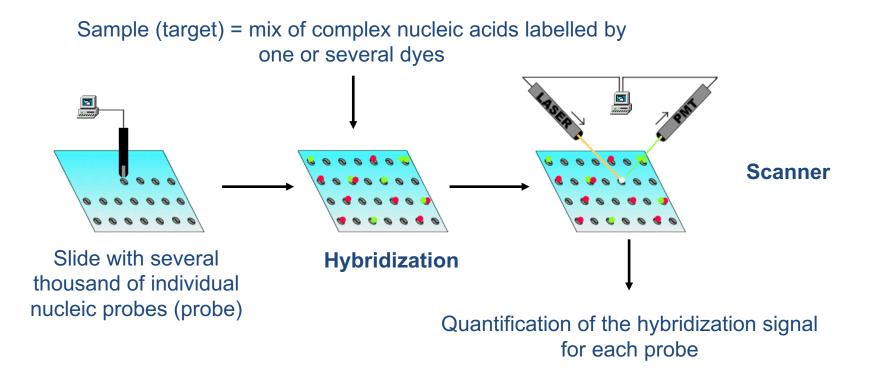


DNA microarray is a functional genomic technique that allows for the analysis of genome and transcriptome of cells

DNA microarray general principle







Microarray application examples





Genotyping

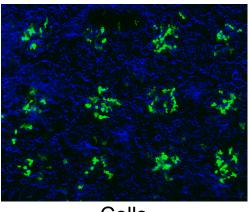
- Polymorphism detection (SNP)
- Mutation detection
- CGH array

Gene expression profiles

- Compare expression levels between various biological conditions
- Transcription and replication dynamic
- RNA stability and maturation study
- Nucleic acids and proteins interaction studies
- Diagnostic (identify pathogenic strains, ...)
- Whole genome expression profile analysis = Transcriptional fingerprint



Tissue samples



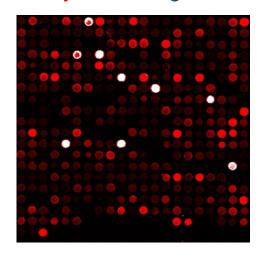
Cells

Image acquisition

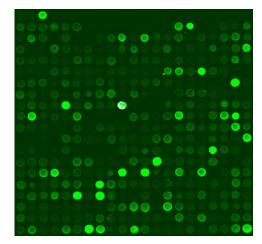




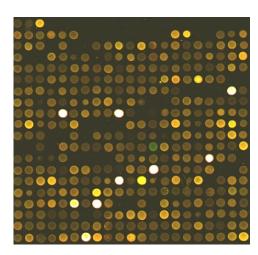
Condition 1
Cy5 wavelength



Condition 2
Cy3 wavelength



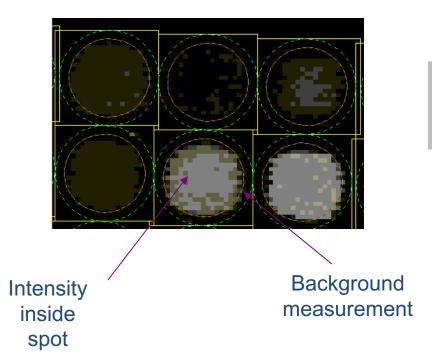
Final image



Globale intensity calculation







Net intensity

Raw intensity - Background

Raw result output

Example of an output file from image analysis software





Position Intensities Size Homogeneity Statistics Annotations Raw Bkg

PUT.	DRO		LEFT	BOT	RGHT	ROV	COL	CHE	CHE	CHIVE	CHII	CHUB	DQAB	SPIX	BGPX	EDGE	RATZ	MRAT	REGR	CORR	LEBAT	CHIGTEI	CHRIGHEI	синдива	DRIGERO	CHREDGEA	CHUEDGEA	FLAG	CHRED	DHKSP	CHUKSD	CHUKD
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76		1 1	0.076	1216-	391	1	16	5373	9677	10.01	4575	769	1062	177	1927		0.9902	0.8636	0.5450	0.8472	0.7687	0.8866	0.9022	0.7514	0.887	0.2641	0.2681	- 0	0.525	1579E-07	0.6697	0.000
127		11 11	1 587	126	412	1	17	4082	9588	6778	4714	784	863	127	927		1335	1344	0.6478	0.6255	1043	0.7962	0.8827	0.5763	0.786	0.2587	0.2868	- 9	0.0742	2.0425/15	0.5368	1,6000
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29		t t	457	1216	472	- 1	20	26.56	7553	175.0	1711	216	1955	177	1268		0.6263		0.954	8.2101	8.3723	0.6437	8.7256	0.4050	0.5533	0.0419	0.2323	- 0	12447	1.10AE-08	0.2625	2.525
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