Difference between FISH and aCGH

Hi everyone,

I received a nice question from one of your classmates. I thought I should thank to the student and let everyone see my answer.

I welcome discussion and questions from all of you.

Best wishes

Moe Kyaw Thu

Question: Dear Dr Moe,

I don't quite clear about the difference between FISH and aCGH. Could you provide examples in which situations FISH is superior to aCGH and vice versa. I truly appreciate your guidance.

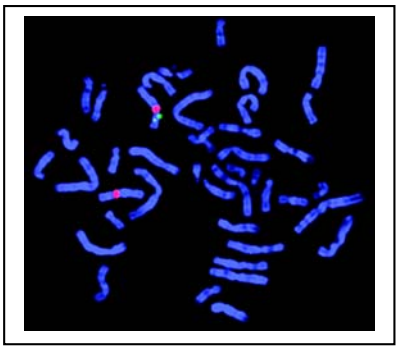
Warm regards,

Answer:

Fluorescence in situ hybridization (FISH) is a laboratory technique to detect a specific DNA sequence on chromosome using a specific DNA sequence or probe. We design and synthesize that DNA sequence in the lab and label with fluorescence dye (here we call it "probe"). We know that this specific sequence on a chromosome is associated with or is a cause of a particular disease (prior knowledge).

The laboratory procedure is a long one. So I won't go into detail. But the principle is that we obtain the cells from the patient (and control healthy subject) and incubate with the labelled probe (we call it "hybridization"). The probe binds the specific sequence on the chromosome. We detect it using fluorescence microscope. Please note that the probe binds (the sequence on) the chromosome. We do not need to extract genomic DNA from the cells.

Here is a sample photo of FISH what we see in the lab. We use a software program to interpret the results. If you like to know more about FISH, please visit http://www.geneticseducation.nhs.uk/laboratory-process-and-testing-techniques/fish



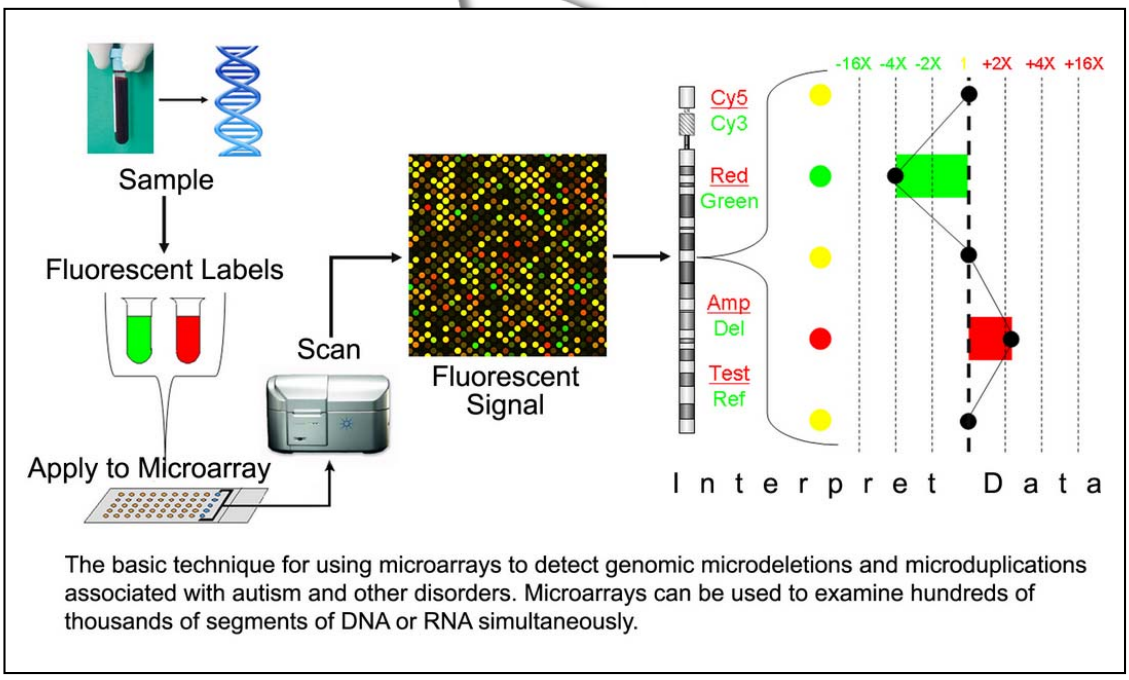
http://www.iconshut.com/

Array CGH (comparative genomic hybridisation) is a laboratory technique that uses array technology to detect the alterations in the genomic DNA sequence. In other words, this method is able to detect the changes or alterations in the genomic DNA sequence that cannot be detected with microscope (like FISH).

To perform aCGH, we need to purchase a ready-made glass slide or membrane that is coated with tens of thousands of genomic DNA sequences. We extract genomic DNA from the patient (and control healthy subject) and labelled with fluorescence dye. In this case, we use different dye for patient and control (e.g. Cy5 for patient and Cy3 for control). Then we incubate the glass slides with these labelled genomic DNA from patient and control subjects.

Finally we detect the colour changes on the glass slides by scanning, export to a software and interpret the data.

Below is a diagrammatic presentation of aCGH. If you like to explore about this technique, please visit http://www.geneticseducation.nhs.uk/laboratory-process-and-testing-techniques/acgh



The basic technique for using microarrays to detect genomic microdeletions and microduplications associated with autism and other disorders. Microarrays can be used to examine hundreds of thousands of segments of DNA or RNA simultaneously.

http://www.agilent.com/about/newsroom/lsca/imagelibrary/index_2008.html

Both techniques are used for pre- and post-natal diagnosis of genetic diseases. No method is superior to the other. It depends what you want to investigate.

Hope this helps.

Best wishes,