Application of FISH technique in clinical sample analysis

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ABSTRACT

Fluorescence *in situ* hybridization (FISH) is an alternative choice to increase the ability to identify chromosomal segment, to correlate chromosome structures with gene location, to reveal cryptic abnormalities that are undetectable using standard banding techniques, and to analyze and describe complex rearrangements. We applied the FISH technique to detect chromosome aberrations, such as chromosome aneuploidies, chromosome microdeletion, chromosome translocation, sex chromosome detection in sex mismatch patients after bone marrow transplantation and HER-2/neu gene amplification status evaluation in breast cancer. All results suggested that, molecular cytogenetic diagnosis via FISH is an efficient and rapid tool for investigating the cause of genetic disorder and cancer.

MATERIALS AND METHODS

All samples in Ramathibodi Hospital were peripheral blood, bone marrow, urine, amniotic fluid and tissue sample such as breast and stomach cancer tissues. The slide was prepared and the specific probes were added. Then, incubate at 73 °C incubator for 5 min. and cool down at 37 °C for 14-16 hours using Thermobrite (Vysis).

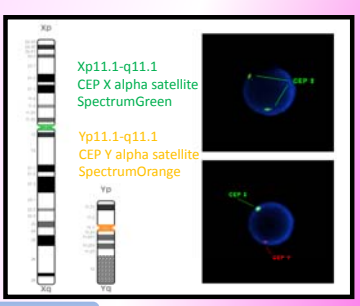

Figure 1 The FISH assays is show male and female samples hybridized with sex chromosome probe showed signals on centromeres of chromosome X (green spot) and chromosome Y (orange spot).

RESULTS

For all probes used in the laboratory of Human Genetic Unit, we followed user guide manuals provided by the manufacturers.

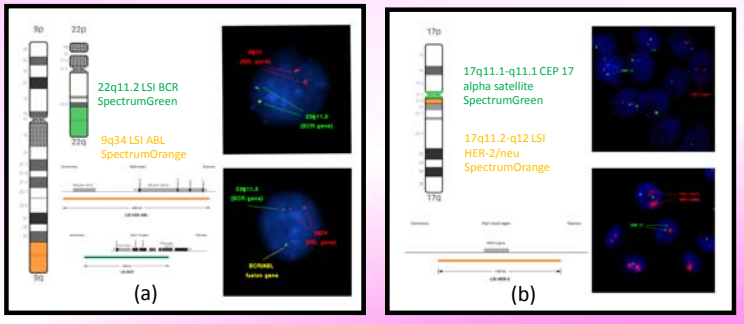

Figure 2 The FISH assays in interphase nuclei : (a) BCR/ABL fusion gene detection (yellow spot), ABL gene on chromosome 9 shows orange spots and BCR gene on chromosome 22 shows green spots. (b) Patterns of HER-2/neu gene copy alteration detected by FISH technique in breast cancer.

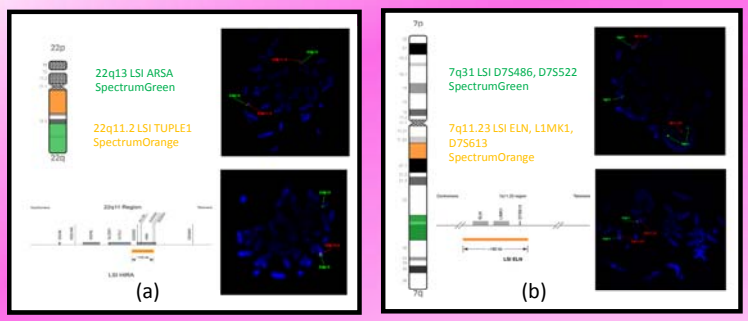

Figure 3 The FISH assays in metaphase chromosome : (a) DiGeorge syndrome on chromosome 22, Control probe located at 22q13 show green signal and TUPLE region probe located at 22q11.2 show orange signal. (b) Williams syndrome on chromosome 7, Control probe located at 7q31 show green signal and ELN gene probe located at 7q11.23 show orange signal.

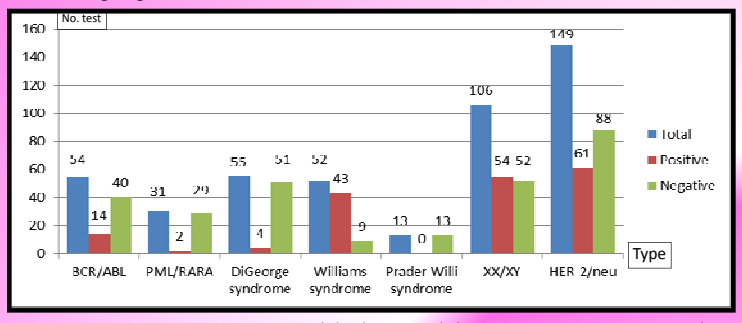

Figure 4 Some FISH assays in Ramathibodi Hospital during 1 January – 30 September 2010 and the results of the particular tests.

CONCLUSION

FISH is a powerful technique for localization of specific nucleic acid sequences in cells, and tissues. This unique ability of FISH provides strong justification for not only its diagnostic use in cancer, prenatal, postnatal, and other genetic diseases but also for patient management plan of the clinicians.

Reference

Richards, CS, Brothman AR, Bellissimo DB, Feldman GL, Grier RE, Grody WW et al. Standards and Guidelines for Clinical Genetics Laboratories. 2006. Available from: http://www.acmg.net/Pages/ACMG_Activities/stds-2002/e.htm. Accessed June 20, 2006.