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of targeted regions was made possible by direct observation based on DNA sequence location, rather than on morphology and banding patterns. It is a powerful tool for analyzing genes and chromosomes because of its high sensitivity and ability to provide information at single gene/cell level besides detecting cell-cell heterogeneity and mosaicism. Further, FISH has been modified to carry out spectral karyotyping/multiplex FISH to identify all 24 chromosomes in one experiment and comparative genomic hybridization (CGH) as well as array CGH (aCGH) to screen whole genome. The major application of FISH is in the field of cancer followed by prenatal diagnosis, preimplantation diagnosis, microdeletion-microduplication syndrome, etc. Detection of cancer-specific chromosome abnormality such as Philadelphia chromosome (bcr-abl fusion gene) assists in diagnosis/sub-classification of disease for selection of appropriate treatment besides more precise prognosis. It can also be used for monitoring of minimal residual disease, early relapse and engraftment of sex-mismatched allogeneic bone marrow transplant. Prenatal fetal chromosome analysis by conventional cytogenetics from amniotic fluid cells requires long time. Long delay in conventional method is unacceptable to most parents and obstetricians in second half of pregnancy following ultrasound detected malformations or abnormal serum screening report because, in many countries, legal limit of pregnancy termination is 20-22 weeks. FISH is capable of providing the answer quickly (within 24 hours) in these situations, thus reduce parental anxiety, and guide obstetric management quickly. In PGD, typically one or two blastomeres are removed (biopsied) from 6-8 cell stage embryo and subjected to FISH for aneuploidy screening, translocation identification or sexing for X linked diseases. FISH is often extremely helpful in specific postnatal situations. FISH on interphase cells can be carried out within few hours in a situation like ambiguous genitalia at birth where immediate assignment of sex is required for not only social reason but also for