Nallasivam Palanisamy, J Cytol Histol 2016, 7:4(Suppl)
http://dx.doi.org/10.4172/2157-7099.C1.008

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Unraveling tumor heterogeneity in prostate cancer by combined immunohistochemistry and RNA *in situ* hybridization

Prostate cancer (PCa) remains the most commonly diagnosed cancer in American men with an estimated incidence of 220,800 new cases and accounting for 27,540 cancer related deaths in 2015. The genetic basis of 50-60% of PCa is attributable to rearrangements in *ETS* genes *(ERG, ETV1, ETV4, ETV5), BRAF, RAF1* and overexpression of *SPINK1*. The discovery and validation of reliable diagnostic methods are warranted to detect these molecular rearrangements. *ETS* gene rearrangements are typically detected by FISH and PCR methods. Recently, monoclonal antibodies against *ERG* have been developed which detect the truncated *ERG* protein and are strongly correlated with *ERG* rearrangement as detected by FISH. However, due to the lack of specific antibodies for *ETV1, ETV4* and *ETV5* genes, in situ detection of these markers is not feasible. We developed a novel RNA in situ hybridization (RNA-ISH) based assay for in situ detection of *ETV1, ETV4,* and *ETV5* in formalin fixed paraffin embedded (FFPE) tissues from prostate needle biopsies, prostatectomy, and metastatic PCa specimens using RNA probes developed by advanced cell diagnostics. Further, with combined RNA-ISH and IHC we identified rare subset of prostate cancer with dual *ETS* gene rearrangements in independent tumor foci. The high specificity and sensitivity of RNA-ISH provides an alternate method for the in situ detection of *ETS* gene aberrations in prostate cancer.

Biography

Nallasivam Palanisamy has adopted newly developed Molecular and Cytogenetic Tools and applied them successfully for the discovery of important cancer-specific biomarkers and has developed diagnostic tools for routine diagnosis and follow-up treatment in the clinics. His work has made a great impact in Cancer Research and he was able to accomplish this by maintaining an independent research program while playing key roles in large team projects at various institutions to make important high-impact contributions to Advance Cancer Research.

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