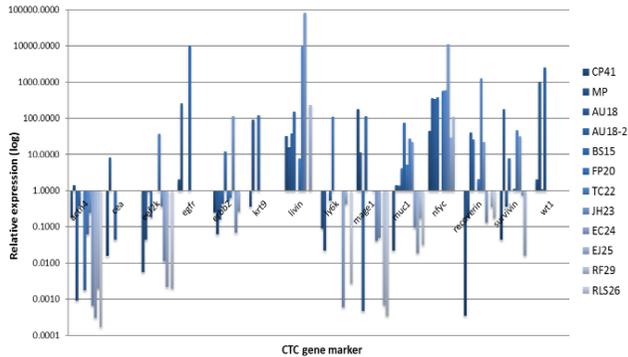


Advantages of 3 and 6 Gene Panel

Figure 1. CTC gene profiling of Filipino cancer patients.



patients showed increased presence of circulating tumor cells as most of the 3-gene markers were up-regulated. The expression analysis of the CTC gene markers of Filipino patients are shown in Figure 1 where the upregulated genes (NFYC, livin, MUC1, recoverin, survivin, wt1 and egfr) are notable.

What is the advantage of 3 and 6 Gene Panel as a blood test?

Blood test is safe and can be performed at many points during the different stages of the disease whereas analysis of solid tumors requires invasive procedures that strongly limit the patient compliance. The ability to monitor across time as the disease progresses allows the development of therapeutic modifications with the potential of improving the patient's quality of life. The 3 and 6 gene panel complements the results obtained from the CTC count.

The MDCTL Facilities



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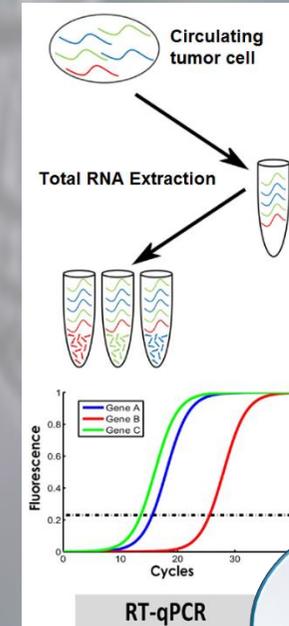
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Tumor Gene Expression Profiling (3 and 6 Gene-Panel)



**Molecular Diagnostics and Cellular
Therapeutics Laboratory
Department of Pathology**

Tumor Gene Expression Profiling (3 and 6 Gene-Panel)



What is Gene Expression Profiling?

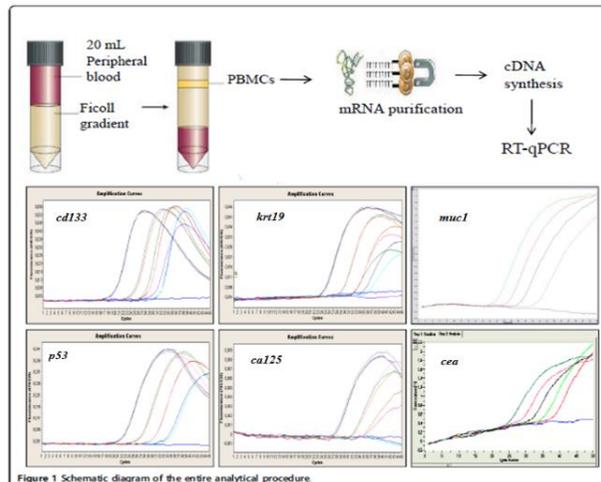
Gene expression profiling is a method used to provide information on the activity of different genes in biological processes including the presence of disease like cancer. It measures the level of biomarkers in the biofluid sample to evaluate a tumor's response to therapy as well as the efficacy of a treatment. It shows great promise as a possible surrogate marker for cancer progression.

The most common technique used is quantitative real-time polymerase chain reaction or qRT-PCR. It determines the expression level of tumor genes from circulating tumor cells (i.e., tumors that have escaped from their primary site and may exhibit malignancy and metastasis). The expression level is quantified in terms of folds-value or how many times the tumor gene from a patient's blood sample has increased as compared to a normal healthy individual.

What is a 3 and 6 Gene-Panel?

A 3-gene or 6-gene Panel is a tumor gene profiling test that involves measuring the level of expression of 3 tumor genes or 6 tumor genes respectively. In the 3-gene panel, the tumor genes measured are namely *CD133*, *KRT19*, and *MUC1*. *CD133* is a cancer stem cell marker. Its detectable presence in the blood indicates malignancy and strong potential for metastasis as the cancer stem cell acts as precursor for new tumor growth in various organs. *KRT19* and *MUC1* are surface antigen markers common in epithelial and aggressively growing tumor cells.

In the 6-gene panel, three additional genes are included depending on the choice of the clinician from the panel of 21 tumor-associated genes (i.e., analyzed in LCP as a full-panel tumor gene expression profiling to support personalized immune cell therapy) although the recommended tumor genes are *P53*, *CA125*, and *CEA*. These tumor gene markers are



Cancer Type	No. of Patients	No. of Patients with Over Expression CTC Gene Markers		
		CD133	KRT19	MUC1
Breast	33	26	22	16
Gastrointestinal	14	9	11	5
Lung	5	4	2	1
Others	8	6	5	3
Total	60	45	40	25

associated with tumor suppression, advancing tumorigenesis and metastasis respectively.

What is the prognostic utility of 3 and 6 Gene-Panel?

As seen in table 1, patients regardless of cancer type more often highly expressed the genes *CD133*, cancer stem cell marker, and *KRT19*, tumor detector marker compared to *MUC1*, tumor anti-apoptosis marker (Angeles et al. 2016). A correlation between stage and number of population of circulating tumor cells expressing the 3-gene markers exist. Stage 1 cancer showed low circulating tumor cell population having none to only one highly expressed CTC marker. Stage 2 to 4 cancer

