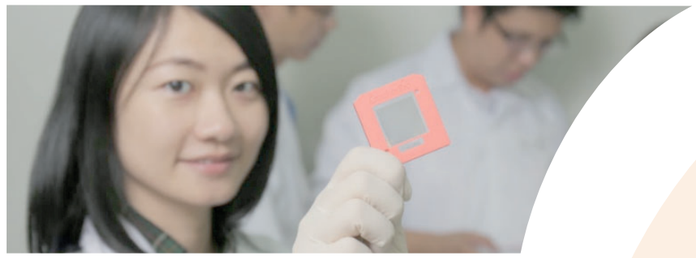

QUARKBIO

QuarkBio strives to become a global leader in providing high quality precision healthcare solutions to our partners through our core technologies by maintaining a strong connection between the latest research findings and the needs of both doctors and patients.

QuarkBio was founded in 2012 on the belief that the one-size-fits-all medical approach is obsolete and that emerging needs of precision healthcare solutions needed to be met in ways that would not be financially burdensome to patients. Taking into account each individual's genetic profile variations, our products provide customers with an extensive spectrum of solutions starting from disease prevention, diagnosis, treatment to prognosis.

QUARKBIO

Simply Possible

Translating Research Discoveries into Precision Oncology Products

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Our Mission :
Bench to Bedside Made Possible

Translating exciting biomarker discoveries into real-world precision oncology products, QuarkBio provides the total solution for realizing years of biomarker research into laboratory developed tests and IVD. By partnering with renowned institutions worldwide, we are developing innovative precision oncology assays to be used alongside clinical exams in order to improve treatment strategies and patients' way of life.

Early Cancer Detection

Breast Cancer Prognosis

Immunotherapy Outcome Prediction

Our Technology :
NextAmp™ Analysis System

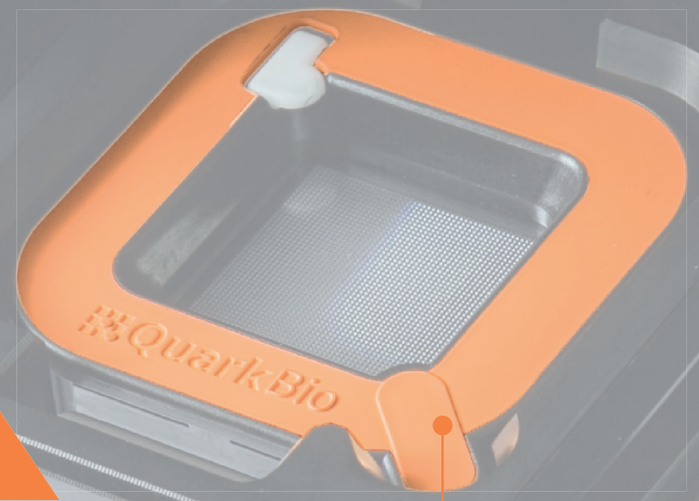
Turning Discoveries into Oncology Products with Clinical Utility

Bench

Bedside

Patient Use

1. Discovery: Expression biomarker discovery from tools such as NGS or microarray
2. Optimization: Biomarker panels customized on PanelChip® with a ready-to-use reagent kit using a simplified workflow
3. Standardization: Routine use of PanelChip® as bedside diagnostics for precision oncology



The Technology Behind PanelChip®

NextAmp™ Analysis System allows healthcare professionals to develop unique, novel multi-marker detection tests for precision oncology. The core component consists of thousands of nanowells, which allows users to detect the expression of multiple biomarkers using amplification reactions. Each nanowell on PanelChip® comes pre-loaded with primers/probes of your choosing, simplifying the workflow for assay handlers.

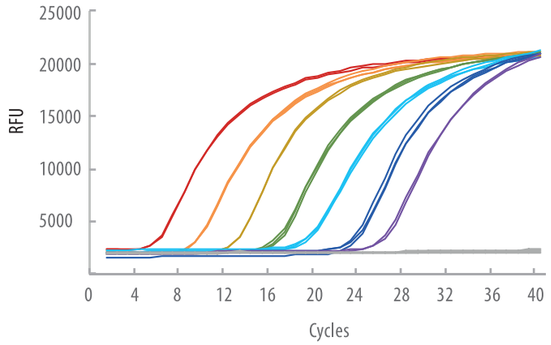
Simple Sample Prep
One step process of less than 10 seconds.

Customizable
Customized panel based on your discoveries from NGS or microarray.

Delivered Ready-To-Use
Reagent kits packaged alongside PanelChip® for immediate use.

Q Station™

A proprietary analyzer for PanelChip® applications, Q Station™ includes built in sample management database and a Cloud-based analysis platform, PanelCloud®, so that running the PanelChip® assays and analyzing the data can be done at the touch of a fingertip.



Key Advantages

dqPCR
Dual functionality: capable of performing both real-time and digital PCR.

Flexible Throughput
Q Station™ is able to process between 1-6 samples at a time.

Quick Turnaround Time
Less than two hours from DNA/cDNA to analyzed data.

Technology Comparisons

NextAmp™ Analysis System delivers concise yet comprehensive tests with operational simplicity, providing a clinical solution that cannot be achieved by NGS, microarray and traditional qPCR.

Platforms	Microarray	NGS	NextAmp™
Mechanism	Hybridization	Sequencing	Amplification
Starting Copy Number	100,000	1-10	1-10
Dynamic Range	2-3 logs	4-5 logs	6 logs
Specificity	<90% homology	80-100% (on-target reads)	95-100%
Precision	<20% CV	<2% CV	<2% CV
Assay Time	2-3 days	>2 days	2 hours
Costs	Medium	High	Low

What Can We Provide?

RNA Expression Collaboration Samples for Serum, Plasma, and FFPE Tissues

Platform Conversion
Your Assays, Our Platform

Integrate and transfer your multiple molecular assays onto our NextAmp™ Analysis System.

Drug and Biomarker Discovery
Subtle Signatures, New Biomarkers

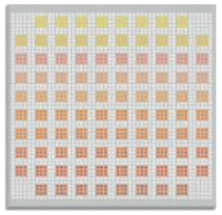
Identify cancer-related miRNA/RNA biomarkers from liquid biopsy samples through NextAmp™ Analysis System.

Panel/Product Development
Novel Biomarkers, Customized Chip

Position novel combinations of biomarkers onto NextAmp™ Analysis System for your own customized,multi-gene assay.

Translation of NGS/Microarray Discoveries into Clinical Products

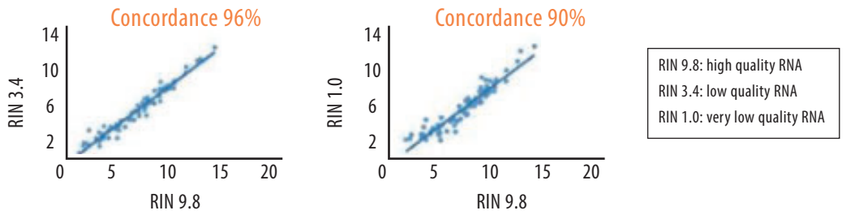
Panel Development with Company A : NGS Results to PanelChip®



A first-in-class assay based on gene expression analysis in tumor microenvironment

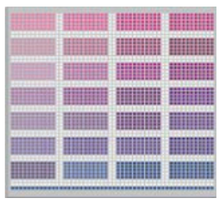
- mRNA biomarkers panel
- To identify immunotherapy responders
- Improve treatment effectiveness

Consistent Results in Difficult Samples Such As FFPE Tissue



RIN 9.8: high quality RNA
RIN 3.4: low quality RNA
RIN 1.0: very low quality RNA

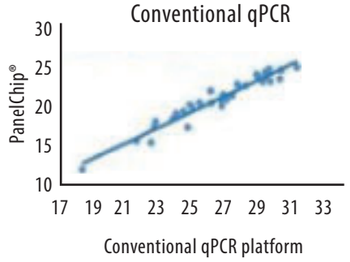
Platform Conversion for Company B : Microarray/qPCR Results to PanelChip®



Most patients with breast cancer are overtreated.

- mRNA biomarkers panel
- To minimize unnecessary therapies
- Local-regional and distant recurrence risks *
- Data based on Asian population *

High Concordance (94%) with Conventional qPCR



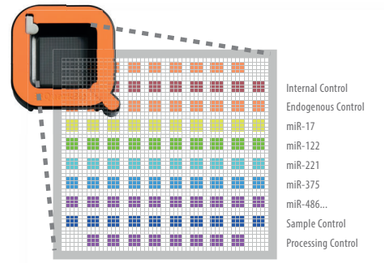
Advantages over qPCR

Platform	PanelChip®	Conventional qPCR
Sample imput	500 ng	2000 ng
Operation	1 loading step	282 loading steps
Cost	$	$$

* Huang, Erich & Cheng, Skye & Dressman, Holly & Pittman, Jennifer & Tsou, Mei-Hua & Fang Horng, Cheng & Bild, Andrea & S Iversen, Edwin & Liao, Ming & Ming Chen, Chii & West, Mike & Nevins, Joseph & T Huang, Andrew. (2003). Gene expression predictors of breast cancer outcomes. Lancet. 361. 1590-6. 10.1016/S0140-6736(03)13308-9.
Huang, T.-T & Pennarun, Nicolas & Cheng, Y-H & Horng, C.-F & Lei, Jason & Cheng, Skye. (2018). Gene expression profiling in prognosis of distant recurrence in HR-positive and HER2-negative breast cancer patients. Oncotarget. 9. 23173-23182. 10.18632/oncotarget.25258.

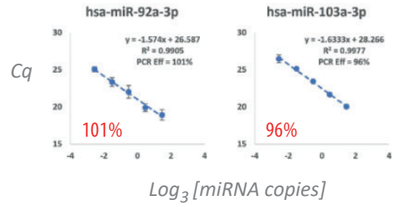
mirSCAN for Extracellular miRNA Biomarker Validation

167 extracellular microRNA biomarkers related to cancer and other diseases identified from over 30,000 publications, translating validated miRNA biomarkers into diagnostic products



miPrimer™ Primers of excellent PCR efficiency capable of distinguishing miRNA family members. **

Excellent PCR Efficiency (up to 90-110%)



No Cross Reactivity Between Family Members

miRNA	hsa-let-7a-5p	hsa-let-7b-5p	hsa-let-7c-5p
hsa-let-7a-5p	100	0	0
hsa-let-7b-5p	0	100	0
hsa-let-7c-5p	0	0	100

mirSCAN™ Analytical Performance ***

PanelChip®	Parameter	Value
mirSCAN™	# of miRNAs	138
	Cut-off Value	Cq<34
Reproducibility	Unique double positives	94.93%
	Fraction single positives	5.07%
	Performance range (log_2)	18.64
	ALU	0.58
Titration reaction	AUC	0.75
Specificity	Off-target combinations with cross reactivity	0%
	Median relative cross reactivity	0%
No template ctrl	Positive miRNAs	16
Plasma miRNA	Detected miRNAs	78

mirSCAN™ Clinical Performance Assessment of 38 oral cancer patients' and 84 healthy donors' plasma samples to predict clinical classification using mirSCAN™. ***

mirSCAN-predicted Classification	Actual Clinical Classification	
	Oral Cancer	Healthy
Oral Cancer	31 (True positive)	1 (False positive)
Healthy	7 (False positive)	83 (True positive)

Sensitivity = 81.6%
Specificity = 98.8%
Precision = 93.4%

** Kang, Shih-Ting & Hsieh, Yi-Shan & Feng, Chi-Ting & Chen, Yu-Ting & Yang, Pok Kwan & Chen, Wei-Ming. (2017). miPrimer: An empirical-based qPCR primer design method for small non-coding microRNA. RNA (New York, N.Y.). 24. 10.1261/rna.061150.117.
*** Hsieh, Chia-Hsun & Chen, Wei-Ming & Hsieh, Yi-Shan & Fan, Ya-Chun & Yang, Pok Kwan & Kang, Shih-Ting & Liao, Chun-Ta. (2018). A Novel Multi-Gene Detection Platform for the Analysis of miRNA Expression. Scientific Reports. 8. 10.1038/s41598-018-29146-7.