CELEMICS

www.celemics.com

Precision Medicine Technology Company

PRODUCT CATALOGUE

Celemics Inc.

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ISO 9001/13485 Certified

CELEMICS

About Celemics

Celemics, A Global Leader in NGS Target Enrichment kits

Aims to provide increased accessibility to proprietary target enrichment technology to increase performance of Next Generation Sequencing applications.

Celemics, the first NGS Target Enrichment kit manufacturer in both Asia and Europe, has secured itself in the global market as a pioneer of Target Enrichment methodology and sample preparation for DNA sequencing and genetic testing. Celemics incorporates its proprietary synthetic probe rebalancing technology in its test kits and panels to ensure maximum performance and accuracy.

Celemics will make a vital contribution to Precision Medicine by ensuring that Next Generation Sequencing service providers can feel confident in the accuracy and efficiency of their testing results through incorporating our Target Enrichment technology.

Next Generation Sequencing is a new engine to understand your DNA

- **Our own target enrichment method**

- Focus on your TARGET

At Celemics, we developed our own target enrichment method to prepare DNA sample. Our target enrichment method has been developed based on in-solution hybrid capture technology. Using the target enrichment method, target genomic regions specifically isolated from whole genome. And prepared DNA sample is applicable to Next Generation Sequencing platform.

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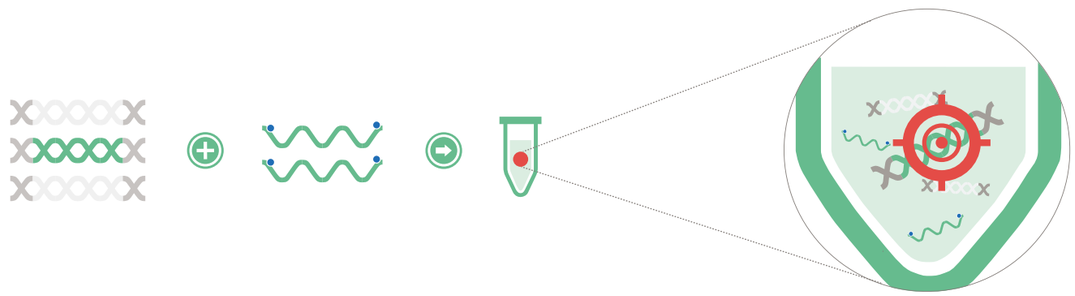
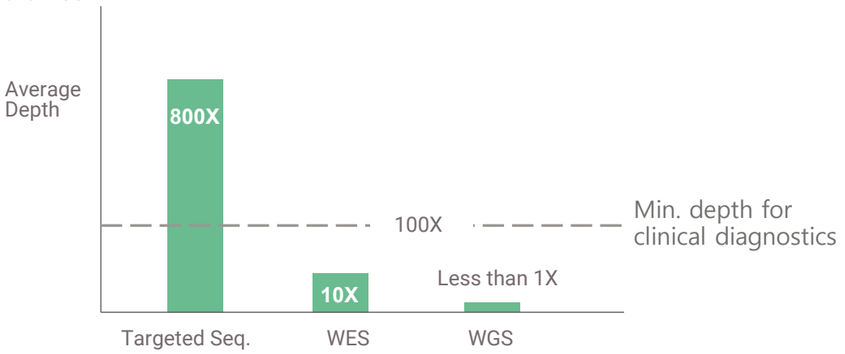


- **Ideal way for clinical diagnostics**

Considering the same data throughput and cost, Targeted sequencing provides much higher average depth compared to WES, and WGS.

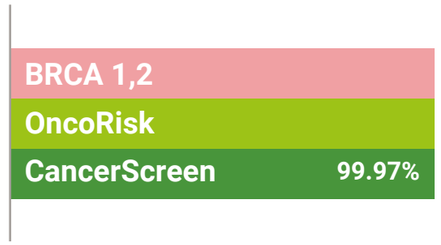


[Sequencing amount : 1Gb]
Targeted Seq.: Target size-500Kb | On target ratio-40%
WES : Target size-60Mb | On target ratio-60

CELEMICS CORE VALUES

Clinical Grade Performance

Highly uniform and well-covered data applicable for clinical diagnostics, covering all important target regions of major genes.



	Kit	1X Coverage	Major Genes
1	BRCA 1,2	100%	BRCA 1,2
2	OncoRisk	100%	ATM, BRCA1,2, MLH1, etc. (total 31 genes)
3	CancerScreen	99.97%	ALK, BRAF, KRAS, etc. (total 15 genes)

Track&Trace, Process Automation

We systematically control the entire genetic test procedure and have established track & trace system to distinguish any case of procedure errors or sample contaminations.

Competitive Pricing

We offer comparatively reasonable and low costs that you cannot get from oversea brand.

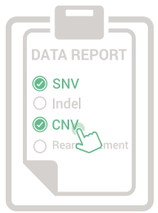
Pre-performance Pilot Test

We run pre-performance pilot test for all genetic test kits, even the customized test kit.
We ensure that each kit fulfills desired performance criteria prior to delivery.
We believe that everyone deserves high quality of test results, no matter what test kit they use.

Fast Turnaround

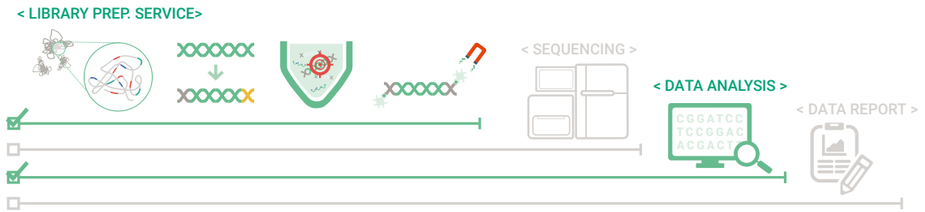
After your purchase order and payment, we deliver our product in about 2 weeks for domestic purchase and 3 weeks for international purchase.
*International delivery period is fully dependent on a delivery destination of purchase.

- **Celemics sharpens your test result**



Our target enrichment method specifically isolates your interest genomic loci out of the whole genome. Also, our rebalancing technology increases the sensitivity of detecting various mutations by sustaining higher average coverage and sequencing uniformity.

- **Celemics supports you upon your laboratory condition**

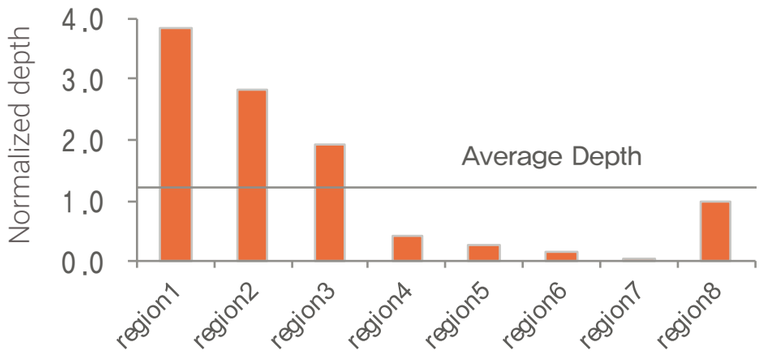


Our service is flexible and supportive from genomic DNA extraction to sequencing data report. You can ask us any range of NGS service that you want according to you laboratory conditions and your need. Our sales team will help you to receive a quote on your request in one business day. Please contact our sales team sales@celemics.com

CELEMICS CORE VALUES

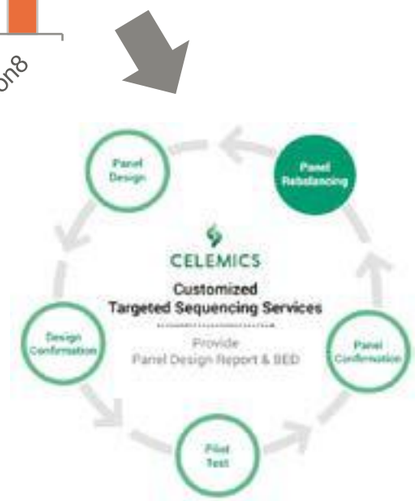
Core Technology - Rebalancing

Conventional Data Profile

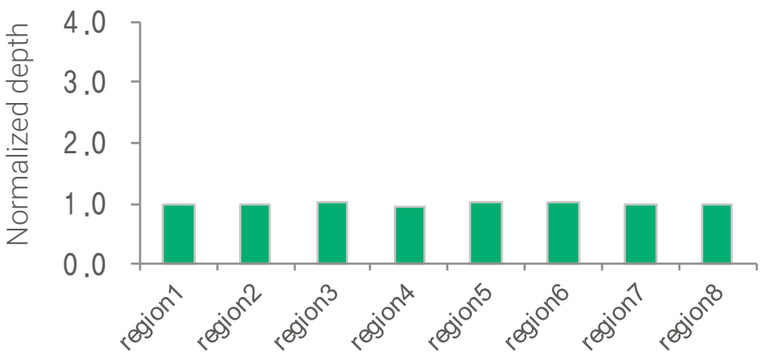


Problem

- Average coverage is not enough.
- High coverage regions dominate average coverage, and low coverage regions are rarely captured



Celemics Rebalancing



Solution

- Rebalancing the probes.
- Sequence re-design, modification and probe profile adjustment are key to produce high coverage and uniformity data.

Observation

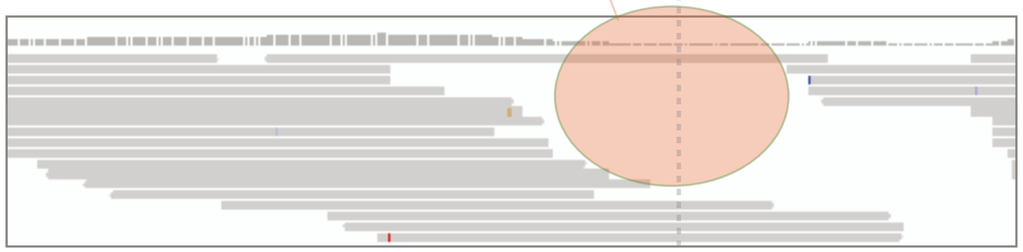
Low coverage region are suffering from insufficient data for accurate mutation detection

Answer

Celemics' rebalancing technique enables an efficient cover all important clinical regions

Problem

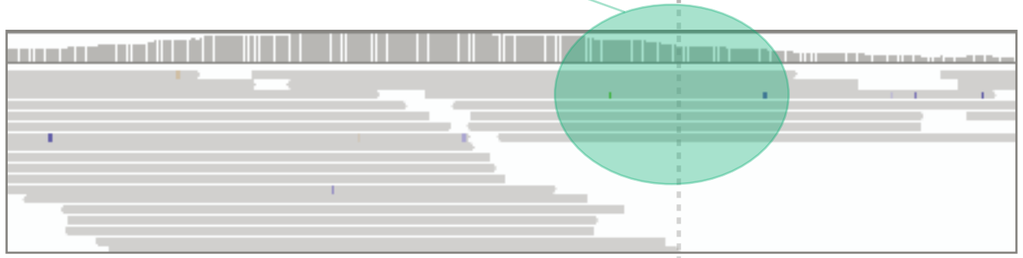
Low coverage region
(Rarely captured reads)



Before / without
Optimization

Improvement
by probe re balancing

Around 5 folds increase in depth



After / with
Celemics
Optimization

Same Locus

CELEMICS CORE VALUES

Enrichment performance comparison Example of Rebalancing

Results

As showed here above Celemics technology enable end user to access data with higher coverage and uniformity enabling reliable and sensitive detection of mutation at a lower cost.

Product Summary

Two types of kits

1. Customed kits
2. Off the shelf kits

Key Features

- Target enrichment method: Hybridization
- High performance
  - Discovery of all types of variants: SNV, InDel, CNV, Rearrangement
  - High coverage and uniformity
  - High sensitivity and specificity, low false negative
  - Applicable to ctDNA and FFPE
- High performance & Applications
  - Targeted Sequencing for Next Generation Sequencing
  - Solid Tumor, Blood Cancer
  - Hereditary Cancer, ctDNA
  - Newborn Screening, Various Genetic Disease
  - Rare Disease / Pharmacogenomics
- Wide compatibility
  - Compatible to all NGS machines available in the market including Illumina, Ion Torrent and Pacific Bioscience
- Guarantee of performance
  - Only product available in the market which performs pre-performance validation before product shipment for every customized panel

Product Summary

Key Performance Indicator

Customized Target Enrichment Kit	Celemics	Company A	Company B	Company C
Enrichment Method	In-solution Hybridization	In-solution Hybridization	PCR or Hybridization	PCR
Coverage	HIGH+	HIGH	MEDIUM	MEDIUM
Uniformity	HIGH+	HIGH	Low	Low
On-target rate	30~70%	20~60%	N.A.	N.A.
Sample Amount	As low as 25ng	1ug	50ng	As low as 10ng
TAT	3~4 weeks	6 weeks	8 weeks	6~8 weeks
Performance Validation	YES	NO	NO	NO

Certificates of Quality Management

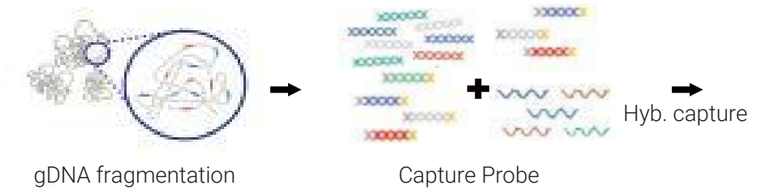
ISO13485

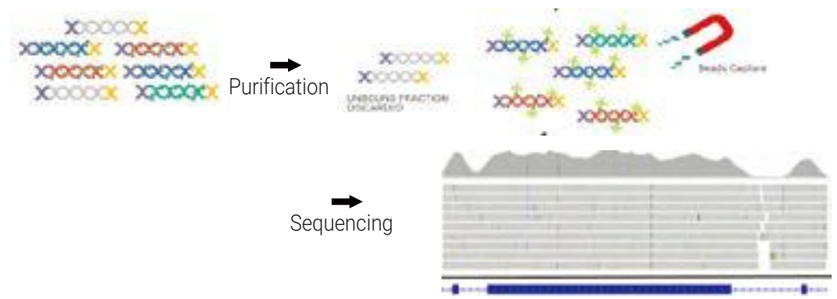
CE-IVD
(BRCA1,2)

GMP

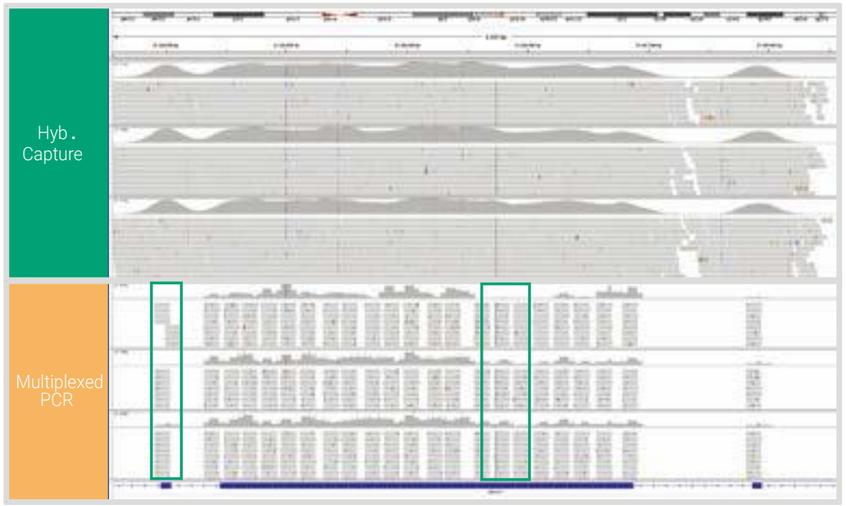
Advantages of Hybridization Enrichment

- **Hybridization Enrichment**
  - Superior uniformity and coverage
  - CNV, Rearrangement Detectable
  - Superior experiment reproducibility





- **Enrichment Bias**



Customized
Target Enrichment Kit

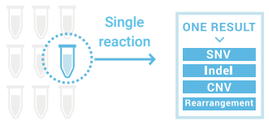
Custom

Customize your own targets!

Celemics has Panel Architect team who supports you to design your own test, which can be optimized upon your purpose for a test. Our target enrichment method is capable of specifically isolating your interest genomic loci out of the whole genome and increases the sensitivity of detecting genetic mutations by producing higher coverage & in-depth sequencing data.

Just list up your genes and design your test

A Custom kit can be designed to cover a target size upto 1.5Mb. (Ask us, if your target is over 1.5Mb)

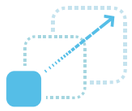


Enhance your customized panel design

Celemics rebalancing technology enables your kit to be elaborated to your purpose for detecting
SNV, Indel, CNV, Rearrangement

Make sure performance before shipment

Interim performance report of your own kit can be provided in 3 weeks after your purchase order.



Scale up your business with your own custom kit

Celemics scalable system is capable of mass production of custom kit that you designed .

GENERAL INFORMATION

Assay genes	~ 1.5Mb (Please send your inquiry to sales@celemics.com for target size over 1.5 Mb)
Target region choice	CDS, CDS+UTR, UTR, Intron
Detectable Mutation Type	SNV, Indel, CNV, Rearrangement

Order Procedure

PRODUCT COMPOSITION

Probe Only	Target Capture Probe
Standard Kit	Library Preparation kit + Adaptors and Index Primers set + customized Target capture reagent (Probe, Hyb. Reagent and Wash Buffers)
All-in-one Kit	Standard Kit + TopQXSEP MagBead , Streptavidin Bead, KAPA HiFi HotStart Ready Mix

CancerScreen Kit

SNV Indel CNV FUSION

PRODUCT

Utilzing Next Generation Sequencing our target enrichment method is capable of specifically isolating your interest genomic regions out of the whole exome and increases the sensitivity of detecting genetic mutations by producing higher coverage & depth sequencing data.

A single test, it covers multiple mutation types

A single kit of CancerScreen enables you to analyze multiple variants such as SNV, Indel, CNV, Rearrangement.

GENERAL INFORMATION

Assay Genes	**Rearrangement**: ALK, RET, ROS1 **Amplification:** ERBB2, MET **SNV, Indel:** APC, BRAF, EGFR, ERBB2, KRAS, MET, NRAS, PIK3CA, SMAD4, TP53
Detectable Mutation Type	SNV, Indel, CNV, Rearrangement
Capture Range	**Whole CDS region, Targeted fusion regions, Accurate CNV** (62Kb)

PRODUCT COMPOSITION

Probe Only	Target Capture Probe
Standard Kit	Library Preparation kit + Adaptors and Index Primers set + CancerScreen Target capture reagent (Probe, Hyb. Reagent and Wash Buffers)
All-in-one Kit	Standard Kit + TopQXSEP MagBead , Streptavidin Bead, KAPA HiFi HotStart Ready Mix(2X)

BRCA 1,2 Kit

BRCA 1 BRCA 2 CE IVD

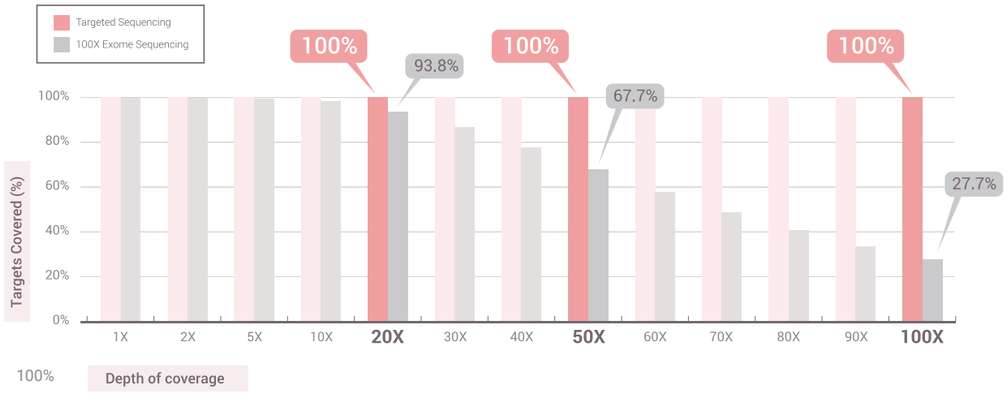
Celemics, on the basis of Next Generation Sequencing, provides BRCA Kit that can be used to identify people who carry a BRCA1or BRCA2 gene mutation. Our target enrichment method is capable of specifically isolating the whole CDS region of BRCA 1, 2 and thereby increasing the sensitivity of detecting genetic mutations.

PERFORMANCE

- Clinical Grade Performance of Target Enrichment

100.0% of coverage with proven test data. (Sequencing amount: 70Mb)

* Possible number of sample in a single Miseq run : approx. 96ea



Source : Celemics, Performance of BRCA 1,2 Kit. Nov. 2014

- Analysis of Single Nucleotide Variation (SNV)

Gene	Mutation Type	Amino Acid Change	Total Depth	REF Depth	ALT Depth	Variant Allele Frequency
BRCA 1	Non-SYN	p.S 1556 G	634	315	301	48.71%
BRCA 1	SYN	p.S 1389 S	876	501	370	42.48%
BRCA 2	Non-SYN	p.N 372 H	396	213	181	45.94%
BRCA 2	SYN	p.L 1521 L	289	0	281	99.29%

Source : Celemics, Performance of BRCA 1,2 Kit. Nov. 2014

GENERAL INFORMATION

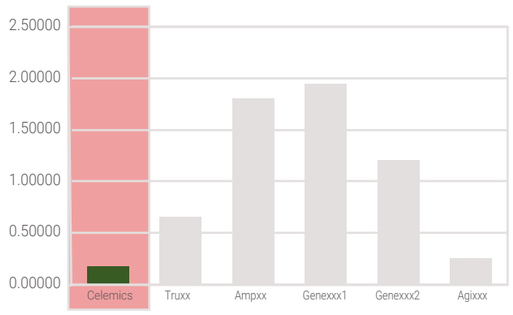
Assay Genes	Whole CDS (+/- 40 bp) region of BRCA1 & BRCA2 (Target size: 17kb)
Detectable Mutation Type	SNV, Indel, CNV
Capture Range	Exon (Exon +/- 40 bp)

PRODUCT COMPOSITION

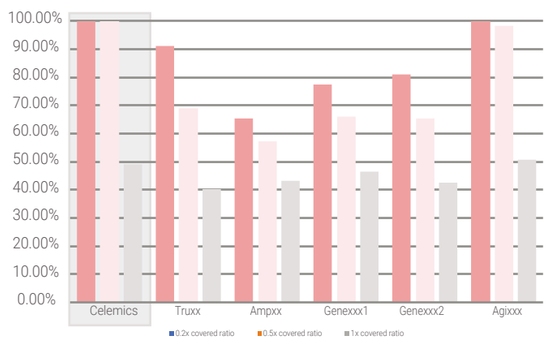
Probe Only	Target Capture Probe
Standard Kit	Library Preparation kit + Adaptors and Index Primers set + BRCA 1,2 Target capture reagent (Probe, Hyb. Reagent and Wash Buffers)
All-in-one Kit	Standard Kit + TopQXSEP MagBead , Streptavidin Bead, KAPA HiFi HotStart Ready Mix(2X)

BRCA 1, 2 - related market data

Uniformity



Coverage



Celemics BRCA 1, 2 target enrichment kit shows best performance comparing to other competitor`s products
It`s cost effective and produce better data

OncoRisk Kit

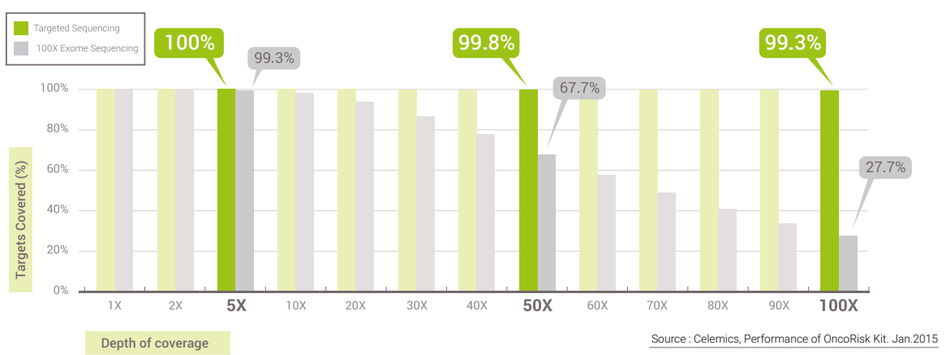
A target enrichment kit designed to analyze 31 genes that are associated with Breast, Ovarian, Colorectal, Endo metrial, Melanoma, Pancreatic, Gastric, Prostate and Lung cancers. Utilizing Next Generation Sequencing, our target enrichment method allows to specifically isolate whole CDS region of oncogenes and thereby increases the sensitivity of detecting genetic mutations

PERFORMANCE

- Clinical Grade Performance of Target Enrichment

  100.0% of coverage with proven test data. (Sequencing amount: 200Mb)

  * Possible number of sample in a single Miseq run : approx. 32ea



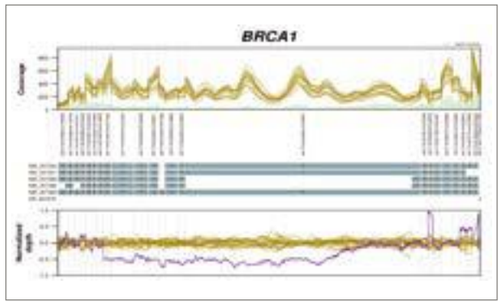
Source : Celemics, Performance of OncoRisk Kit. Jan.2015

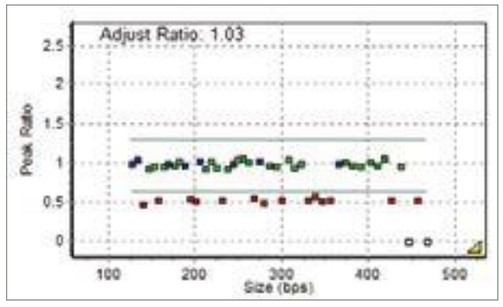
- Analysis of Single Nucleotide Variation (SNV)

Gene	Mutation Type	Amino Acid Change	Total Depth	REF Depth	ALT Depth	Variant Allele Frequency
APC	SYN	p.S 1738 S	1008	590	415	41.17%
ATM	Non-SYN	p.D 1853 N	417	200	217	52.04%
BARD1	Non-SYN	p.R 658 C	829	435	394	47.53%
BMPR1A	Non-SYN	p.P 2 T	621	309	311	50.08%
BRCA1	SYN	p.S 1389 S	802	460	342	42.64%
BRCA2	SYN	p.V 2171 V	1026	0	1026	100%
BRIP1	SYN	p.Y 1137 Y	844	3	840	99.53%
CDH1	SYN	p.A 692 A	732	398	334	45.63%
EPCAM	Non-SYN	p.M 115 T	889	441	448	50.39%
MSH6	SYN	p.T 1102 T	292	143	149	51.03%
MUTYH	Non-SYN	p.Q 324 H	331	167	164	49.55%
NBN	SYN	p.P 672 P	604	299	305	50.50%
PMS2	Non-SYN	p.K 541 E	646	0	646	100%
PRSS1	SYN	p.N 246 N	921	0	921	100%
RAD51D	Non-SYN	p.R 53 Q	971	0	971	100%
SLX4	SYN	p.N 1500 N	993	493	500	50.35%
TP53	Non-SYN	p.P 33 R	850	438	410	48.24%

Source : Celemics, Performance of OncoRisk Kit. Jan.2015

- Analysis of Copy Number Variation (CNV)





PRODUCT

GENERAL INFORMATION

Assay Genes	APC, ATM, BARD1, BLM, BMPR1A, BRCA1, BRCA2, BRIP1, CDH1, CDK4, CDKN2A, CHEK2, EPCAM, MLH1, MRE11A, MSH2, MSH6, MUTYH, NBN, PALB2, PMS2, PRSS1, PTEN, RAD50, RAD51C, RAD51D, SLX4, SMAD4, STK11, TP53, VHL
Detectable Mutation Type	SNV, Indel, CNV
Capture Range	Whole CDS (+/- 40 bp) region (Target size: 97kb)

PRODUCT COMPOSITION

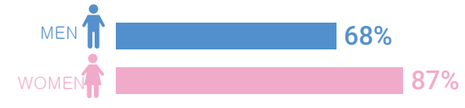
Probe Only	Target Capture Probe
Standard Kit	Library Preparation kit + Adaptors and Index Primers set + OncoRisk Target capture reagent (Probe, Hyb. Reagent and Wash Buffers)
All-in-one Kit	Standard Kit + TopQXSEP MagBead , Streptavidin Bead, KAPA HiFi HotStart Ready Mix(2X)

REFERENCE

Studies have shown the specific genes carrying mutation have potential risk to develop certain types of cancers.

CDHI / Hereditary diffuse **GASTRIC CANCER**

Lifetime risk of developing cancer
BY AGE 80



TP53 / Li-Fraumeni syndrome

lifetime risk of developing cancer
BY AGE 30 **21~49%**

LIFETIME RISK
lifetime risk of developing cancer **68~93%**

1. Pharoah, P.D., et al., Incidence of gastric cancer and breast cancer in CDH1 (E-cadherin) mutation carriers from hereditary diffuse gastric cancer families. Gastroenterology, 2001. 121(6): p. 1348-53.

2. Hwang, S.J., et al., Germline p53 mutations in a cohort with childhood sarcoma: sex differences in cancer risk. Am J Hum Genet, 2003. 72(4): p. 975-83.

TopQXSEP MagBead

Enhance quality of your precious samples

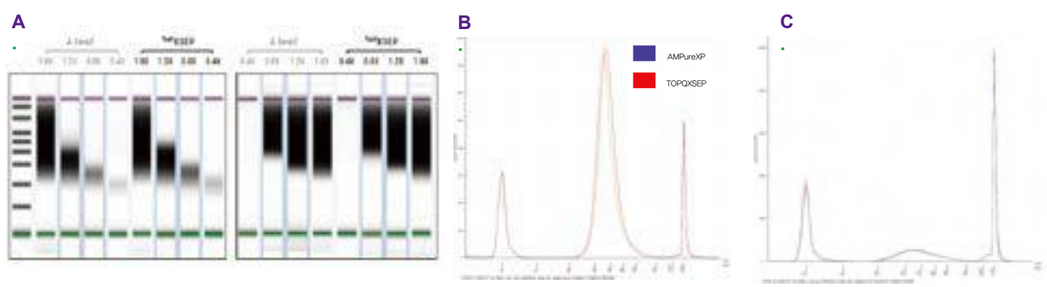
TopQXSEP MagBead utilizes unique magnetic bead-based chemistry for the purification of nucleic acids, providing a simple, flexible and highly reproducible procedures.

TopQXSEP MagBead for DNA Clean-Up

TopQXSEP MagBead is designed to remove incorporated reaction components such as dNTPs, salts, and enzymes after post PCR. It also provides a affordable workflow for quick and high-efficient purification of PCR amplicons.

TopQXSEP MagBead for size selection and high yield efficiency

Size selection is required to produce a uniform distribution of fragments around an average size.
TopQXSEP MagBead is optimized for next generation sequencing platforms and fragment size selection along with high yieldefficiency.



A. B. Highly reproducible final library size distribution is achieved with TopQXSEP MagBead . The effect of concentration of input DNA on fragment selection measured by Agilent® Tape Station. C. The comparison data which performed by TOPQXSEP bead shows the high-efficiency of DNA sample recovery.

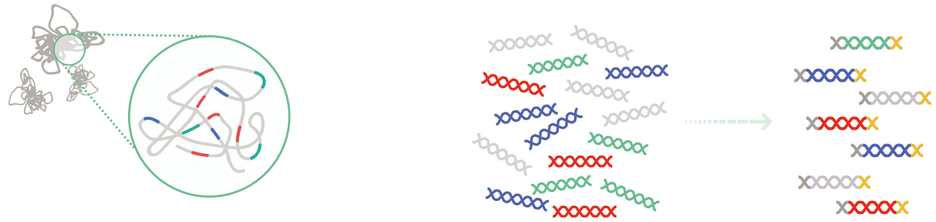
Applications

Sanger sequencing
Next generation sequencing
Nucleic acid purification

Benefits

Flexible Clean-Up
Efficient removal of unwanted components
Manual and automation-friendly protocol
No centrifugation or filtration required

ASSAY PROCEDURE



1

Shearing of gDNA

Sample genomic DNA is fragmented into small pieces of DNA by sonication.

2

Library Prep.

Artificial double-stranded DNA, called adaptor, is incorporated with different enzymes.

3

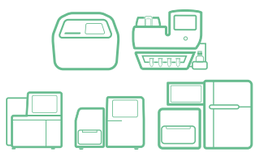
In-solution Hybridization

Sample libraries are denatured into sin-gle-stranded DNA and then hybridized to biotin-labeled probes specif-ic to the targeted region.

4

Post Hybridization Process

Biotinylated sample library is then enriched by adding streptavidin beads that will bind to the biotinylated probes.



5

NGS run

Subsequently, target-enriched sample library is sequenced on NGS platform.

6

Data Analysis

Sequence data generated from NGS platform is analyzed by Celemics bioinformatics pipeline.

7

Data Report

Data report includes raw sequence data, list of generic mutations such as SNP, Indel, Rearrangement (Fusion), CNV.

APPLICATION NGS PLATFORM

Illumina	Ion-Torrent
NovaSeq / HiSeq / NextSeq / MiSeq / MiniSeq / iSeq	S5 / Proton / PGM

PRODUCT COMPOSITION

Sample Library Preparation	End repair enzyme mix / A-tailing enzyme mix / Ligation enzyme mix
Hybridization	• Target specific hybridization probe • Hybridization Buffers and Blocking mix
Index Kit	• 16rxn package includes 16 index (Single index type) • 48rxn package includes 48 index (Dual index type) • 96rxn package includes 96 index (Dual index type)
Post Hybridization Wash	• Buffers for post hybridization wash

SAMPLE QUALITY RECOMMENDATION

Celemics, Inc strongly recommends the submission of samples according to the following guidelines.
Please inquire if the minimum requirements cannot be met so we can propose an alternate optimized solution on a case by case basis.

Sample Type	Amount	Concentration	Purity
Human genomic DNA extracted from blood, tissue, saliva	≥750ng	≥15ng/ul highly recommends the use of a fluorometric assay	A260/A280 = 1.8-2.0
Human genomic DNA extracted from FFPE; Formalin-Fixed Paraffin-Embedded	≥200ng	≥2.5ng/ul	A260/A280 = 1.8-2.0

*** Important Note**
- For strongly degraded templates, such as FFPE samples, Celemics recommends to submit highest possible amount.
- And sequencing result may vary according to the quality of samples applied to a test.

*** Additional Note**
- Genomic DNA should be eluted in pure sterile water or TE buffer.

TEST RECOMMENDATION

Read Length	75 ~ 150 bp (recommended, but depending on sequencer type)
Supplement	• Plastic wares • Magnetic beads for DNA purification (Example: Ampure XP magnetic bead) • Streptavidin coated magnetic bead (Example: Dynabead T1) • Polymerase for amplification (Example: Kapa Library Amplification kit, Herculase II, Phusion Polymerase)
Equipment	• DNA shearing device (Example: Covaris) • DNA quantification device (Example: Bioanalyzer, LabChip GX, Tapestation, Qubit) • Thermocycler (PCR machine) • Magnetic Rack • Speed vaccum system

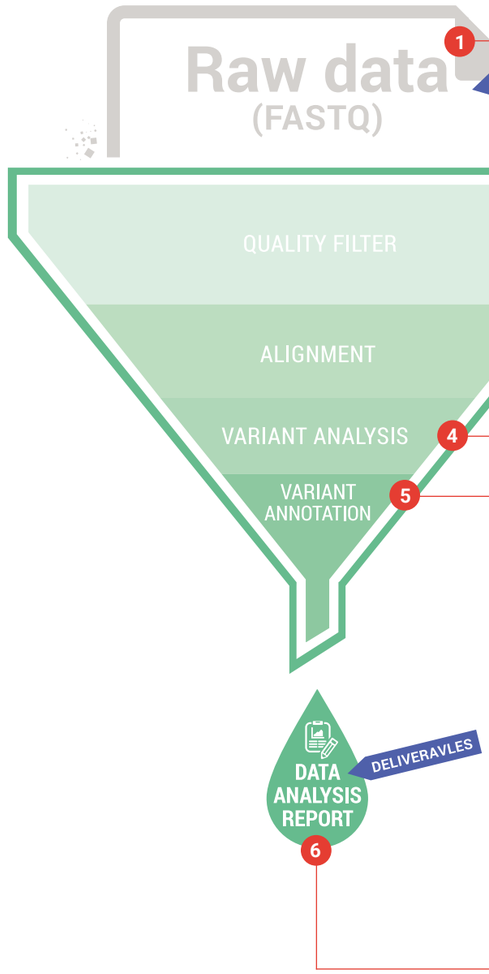
* Research use only
** Kit performance may vary upon a quality of sample's gDNA.
*** Any of items in the Test Recommendation section is not provided by Celemics.

SAMPLE DELIVERY METHOD

DHL or Fedex highly recommend to use trackable shipping carrier

COMPREHENSIVE BIOINFORMATICS PLATFORM

This process derives statistically accurate analysis of genetic mutation from you sequencing raw data.



Row data (FASTQ)

Pure sequence data from NGS Platform.

Quality Filter

Low quality data which can degrade a final result are filtered.

Alignment

BWA is applied to read alignments.

Variant Call

Variant calls from aligned reads.

Variant Annotation

Our BI solution built from public data base automatically brings variant annotations through its algorithm. The BI solution continues to be updated with public data base which is widely accepted in Bioinformatics field.

Data Analysis Report

Data report includes raw sequence data, list of generic mutations such as SNV, Indel, CNV, Rearrangement (Fusion).

Report Formet

FASTQ, Variant call & annotation

DELIVERABLES

Offline delivery	HDD (Extra fee can be charged for HDD)
Online delivery	FTP server

* Free storage period : 3 month

TrueRepertoire ™

Celemics, Inc. has developed a NGS-based antibody sequencing platform with the aim to overcome key issues of sequencing error, short-read length and high-cost gene synthesis for further characterization. Celemics' newly developed platform, TrueRepertoire ™ will allow you to sequence scFv or Fab library, analyze the entire variable region and process >10,000 clones for a single experiment.

What TrueRepertoire ™ can do :

- Offer accurate NGS-based V_L – V_H linkage antibody sequences
- Identify and analyze 10,000 clones at once
- Allow analysis of rare clones that were hard to find in conventional methods
- Provide physical DNAs for further characterization

Please feel free to contact Celemics!

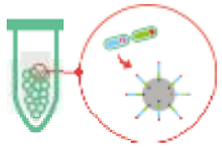
Celemics, Inc 20F, Bldg.A, BYC Highcity, 131, Gasandigital 1-ro, Geumcheon-gu, 08506, Korea

82.2.6966.0173 82.2.6746.8073 support@celemics.com www.celemics.com

CELEMICS

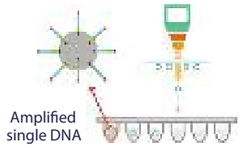
Technology :

1



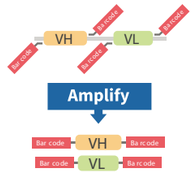
Molecular cloning of antibody library

2



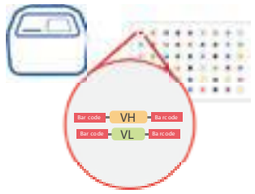
High-throughput DNA isolation

3



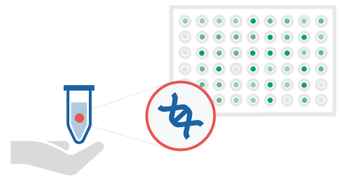
Multiplexed DNA barcoding

4



NGS
V_L- V_H linkage analysis

5



DNA retrieval for characterization !

Sample Requirement :

Plasmid DNA or amplicons containing variable light and heavy domain of antibody

- ✓ Initial or bio-panned library
- ✓ scFv or Fab format

* Please send your inquiry to Celemics technical support team (support@celemics.com)

Deliverables :

- ✓ Fully-annotated antibody sequences (DNA/Amino Acid including V_L-V_H linkage information) with comprehensive in silico analysis report
- ✓ Sequence-verified, error-free physical antibody DNA