CytoQuest™ CR

Abnova

Non-invasive, Circulating Rare Cell Isolation and Retrieval System

Abnova's CytoQuest™ CR is a non-invasive system for capture, enumeration, isolation and retrieval of circulating rare cells (CRCs). Three major subtypes of CRCs in translational research and clinical studies are circulating tumor cells (CTCs), circulating progenitor cells (CPCs), and circulating fetal cells (CFCs). A challenge for market adoption of CRCs is the efficient and reproducible identification, single cell isolation, and retrieval of highly pure and viable CRCs, with their applications supported by a wide repertoire of standardized, GMP grade bioreagents.

CytoQuest™ CR technology utilizes SCx™ spiral chamber, HBx™ micromixer, antibody immobilized nanoarray, and TCx™ thermal control to enable a multitude of CRC functions. SCx™ spiral chamber is equipped with a non-sticky coil and a self-contained micro-vibrator for unimpeded delivery of pretreated blood sample into the nanoarray. HBx™ micromixer provides a herringbone conduit for cell mixing. CytoChipNano is a streptavidin nanoarray which captures the CRCs for cell enumeration and single cell isolation by laser micro-dissection or micromanipulation. CytoChipNano CR is a specialized streptavidin nanoarray with thermo-sensitive gold coating which captures and releases the CRCs via a TCx™ thermal control of alternating temperatures.

Monoclonal antibodies targeting specific surface biomarkers of circulating rare cells can be flexibly interchanged to accommodate the biomarker switch in CRC progression. This results in highly pure and viable CRCs for downstream protein characterizations, gene analyses, and cell assays. Cell enumeration is currently the only FDA approved application as a prognostic marker in breast, prostate, and colorectal cancers. In contrast, effective single cell isolation and retrieval of CRCs opens up new scope of applications in the diagnostic and pharmaceutical industry.

Subtypes of CRCs

- Circulating tumor cells (CTCs)
- Circulating progenitor cells (CPCs)
- Circulating fetal cells (CFCs)

Applications of CRCs

- Protein Characterizations
- Gene Analyses
- Cell Assays

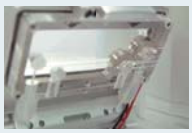
Advantage of Integrated CytoQuest™ CR

- Fluidic pump
- Coupler
- SCx™ spiral chamber
- HBx™ micromixer
- TCx™ thermal control

Antibody-Based, Cell Capture

- Cell enumeration (CytoChipNano)
- Single cell isolation (CytoChipNano)
- Thermal cell release (CytoChipNano CR)

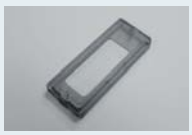
Chip Receptor



Coupler

SCx™ Spiral Chamber

HBx™ Micromixer

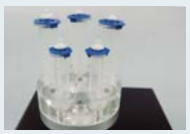


CytoChipNano

CytoChipNano CR

TCx™ Thermal Chuck

Fluidic



Buffer Reservoir

Temperature Control

Tension Adjustor

Power On LED

Hardware General Specifications	
Dimensions:	501.6mm(h) x 340.8mm(d) x 271.8mm(w)
Weight:	18 kg
Power:	100-240VAC ; 85-250VAC
Current:	1A typical (1.5A peak) ; 3.5A typical (4A peak)
Operating Temperature:	60°F to 95°F (15°C to 35°C)
Programable Thermo Control Profile:	4-40°C, Variable Time Span

Hardware Environmental Specifications	
Storage Temperature:	-5°F to 158°F (-20°C to 70°C)
Operation Altitude:	Up to 2000m
Operation Environment:	For Indoor Use
Operating Humidity:	20% to 90% Relative Humidity, Non-Condensing
Storage Humidity:	20% to 90% Relative Humidity, Non-Condensing

Software Specifications	
Scanner Function:	Scanning Capability to Read QR Code/Barcode
Status Display:	Progress and Fluid Handling
System Clean:	Prime and Clean
Report Generation:	Print and Export File
Necessary Driver:	LabVIEW Run-Time Engine 2011 (Standard RTE) NI-VISA Run-Time Engine 5.4 PL2303_Prolific_DriverInstaller_v1.9.0

Pad PC Specifications	
Operating System:	Windows 8/7/Vista (32-bit and 64-bit) Windows XP SP3 (32-bit) Windows Server 2003 R2 (32-bit) Windows Server 2008 R2 (64-bit)
Processor:	Pentium III/Celeron 866 MHz or Equivalent
Memory:	256MB Minimum (512MB Recommended)
Free Disk Space:	1GB
Interfaces/USB Ports:	USB Port *1

Reference:

- Three-dimensional nanostructured substrates toward efficient capture of circulating tumor cells. Wang S, Wang H, Jiao J, Chen KJ, Owens GE, Kamei K, Sun J, Sherman DJ, Behrenbruch CP, Wu H, Tseng HR. Angew Chem Int Ed Engl. 2009;48(47):8970-3
- Highly efficient capture of circulating tumor cells by using nanostructured silicon substrates with integrated chaotic micromixers. Wang S, Liu K, Liu J, Yu ZT, Xu X, Zhao L, Lee T, Lee EK, Reiss J, Lee YK, Chung LW, Huang J, Rettig M, Seligson D, Duraiswamy KN, Shen CK, Tseng HR. Angew Chem Int Ed Engl. 2011 Mar 21;50(13):3084-8.
- Capture and stimulated release of circulating tumor cells on polymer-grafted silicon nanostructures. Hou S, Zhao H, Zhao L, Shen Q, Wei KS, Suh DY, Nakao A, Garcia MA, Song M, Lee T, Xiong B, Luo SC, Tseng HR, Yu HH. Adv Mater. 2013 Mar 20;25(11):1547-51
- High-Purity Prostate Circulating Tumor Cell Isolation by a Polymer Nanofiber-Embedded Microchip for Whole Exome Sequencing. Zhao L, Lu YT, Li F, Wu K, Hou S, Yu J, Shen Q, Wu D, Song M, Ouyang WH, Luo Z, Lee T, Fang X, Shao C, Xu X, Garcia MA, Chung LW, Rettig M, Tseng HR, Posadas EM. Adv Mater. 2013 Mar 26.

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