Abnova

Captor™

Label-Free, Microfiltration System for Isolation, Enumeration, and Retrieval of Viable CTCs

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Abnova's Captor™ is an label-free, microfiltration system for isolation, enumeration, and retrieval of viable circulating tumor cells (CTCs). Circulating tumor cells are cancer cells that have detached from the main tumor before entering the bloodstream. They represent an important transition in cancer transformation and metastasis, and portend significant clinical impact in diagnosis, prognosis, treatment, and monitoring. Current isolation methods of circulating tumor cells rely on more complicated and harsher techniques and use of general surface biomarkers to capture the CTCs. This results in biochemical alterations and damages to the CTCs rendering them unsuitable for downstream protein and gene analysis and cell culture.

Captor™ system utilizes a proprietary Clear Cell® CTChip™ technology based on sophisticated fluid dynamics and myriads of crescent-shaped microwells to ensure capturing of CTCs while leaving other whole blood constituents to flow through. Although CTCs and larger white blood cells are of comparable sizes, CTCs are stiffer, less deformable, and effectively trapped within the microwells. This elegant and simplistic design maximizes CTCs isolation efficiency, purity, and function by preserving CTCs surface integrity, allowing retrieval of the viable cells in their native state.

Captor™ has a built-in real time imaging system for viewing and digitizing the images during the isolation process. CTChip™ allows for cell enumeration by counting the numbers of CTCs which have been isolated in the chip. The entire CTChip™ can also be transferred to a fluorescent microscope for immunofluorescence and FISH probe staining for examination and characterization of tumor cells. Cells retrieved using the CTChip™ have been shown to be similar to their normal cultures in terms of proliferation rate and morphology, supporting that CTCs are not altered and remain viable.

Applications of CTCs

- Isolation, enumeration, and retrieval
- Protein and gene characterization
- Cell culture and functional studies
- Isolation of cancer stem cells
- Animal cancer model research
- Clinical cancer research

Advantages of Captor™ Platform

- Separate CTChip™ for staining & retrieval
- Transferrable CTChip™ for fluorescent studies
- Real-time imaging of cell isolation

Advantages of CTChip™

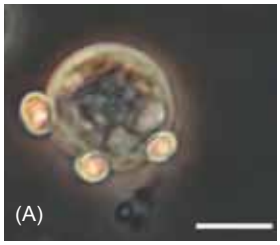
- Cell isolation, enumeration, and staining
- Retrieval of wholly intact, viable CTCs
- Label-free, not rely on capture antibody
- High cell purity
- High isolation sensitivity & retrieval efficiency

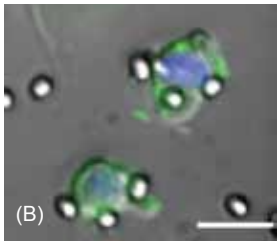
Chip Holder

CTChip™- Staining

CTChip™- Retrieval

Demonstrations

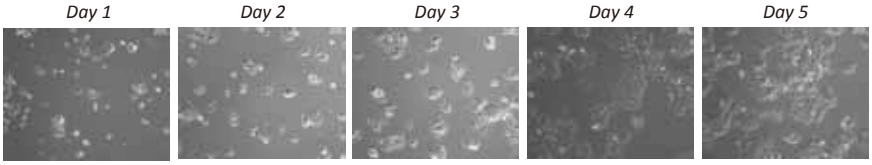




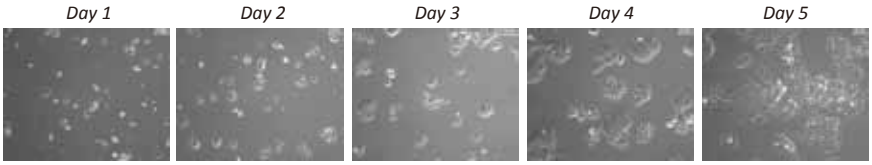
Cell Isolation, Enumeration, and Staining

CTC isolation from clinical blood samples of metastatic lung cancer patients. (A) Phase contrast images of isolated CTC after blood processing. Scale bar represents 10μm. (B) Immunofluorescence staining of isolated cells being Pan-CK positive (green), CD45 negative (red) and DAPI positive (blue) to identify cancer and hematopoietic cells. Scale bar represents 20 μm.

Demonstrations



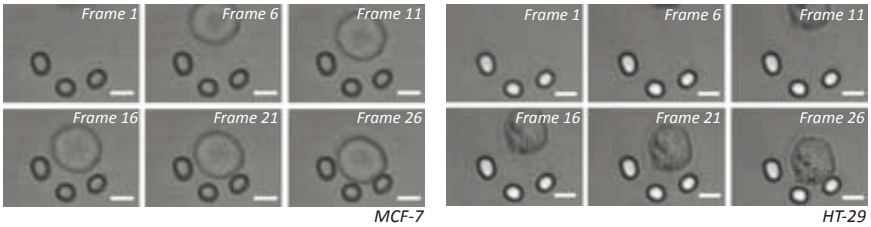
Control – Normal MCF-7 culture



Experiment – Reseeded MCF-7 after isolation

Retrieval of Wholly Intact, Viable CTCs

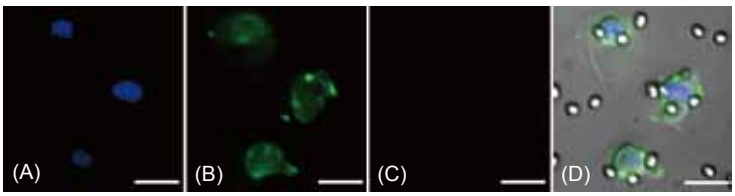
Cell proliferation comparison between normal cultures (control) and retrieved cells over a period of 5 days. No observable differences in cell proliferation rate for MCF-7 cancer cells. Scale bar represents 100µm.



MCF-7 *HT-29*

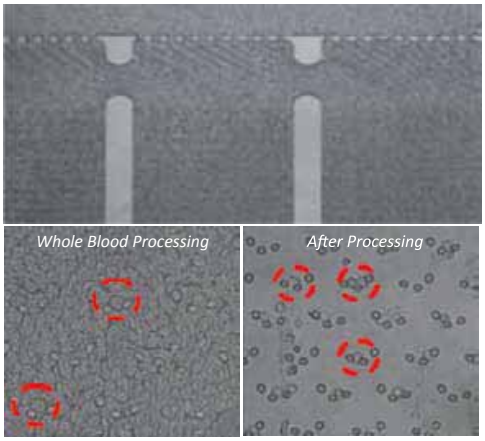
Label-Free, Not Rely on Capture Antibody

Crescent-shaped isolation wells gently separate CTCs from other blood components based on the difference in sizes and cell deformability while protecting the cells from damage.



High Cell Purity

CTC isolation from clinical blood samples of metastatic lung cancer patients. Immunofluorescence staining of isolated cells to identify cancer cells (A) DAPI with blue fluorescence and (B) Pan-CK with green fluorescence, and hematopoietic cells (C) CD45 negative. (D) Merged picture of (A), (B), and (C). Only CTCs are trapped in our device, while the rest of blood constituents continue to flow through smoothly, thereby achieving higher specificity and purity of the sample. Scale bar represents 20 µm.



High Isolation Sensitivity & Retrieval Efficiency

Whole blood processing in the CTChip™ from actual cancer patient blood. Bottom Left: CTC isolated during blood processing; Right: CTC isolated after completed blood processing. Under optimum conditions, CTChip™ is able to successfully trap cancer cells with at least 80% isolation efficiency. Retrieval is done by simply altering the flow direction such that the CTCs stream towards the cell collection point. The rounded crescent base of the wells minimizes obstruction and protects the CTCs against trauma, thereby ensuring a high percentile of retrieval.

Captor™

General Specifications

Dimensions:	42cm(h) x 24cm(d) x 16cm(w)
Weight (kg):	16
Power:	100~240V
Current:	max. 1 A
Operating Temperature:	15-30°C

Imaging Module Specifications

Frame resolution:	1024 x 768 (in maximum view)
Frame rate:	~8Hz
XY Movement:	25mm
Image Output Format:	JPG
Video Output Format:	AVI (custom codec may be required)

Environmental Specifications

Storage Temperature:	5 - 40°C
Operation Environment:	For indoor use
Altitude:	Up to 2000m
Pollution Degree:	1or 2, in accordance with IEC66
Humidity:	Maximum 80% Relative Humidity (RH) up to 30°C, decreasing linearly to 50% RH at 40°C

Reference

Technology

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