ONCO DISCOVER
Circulating Tumor Cell Test

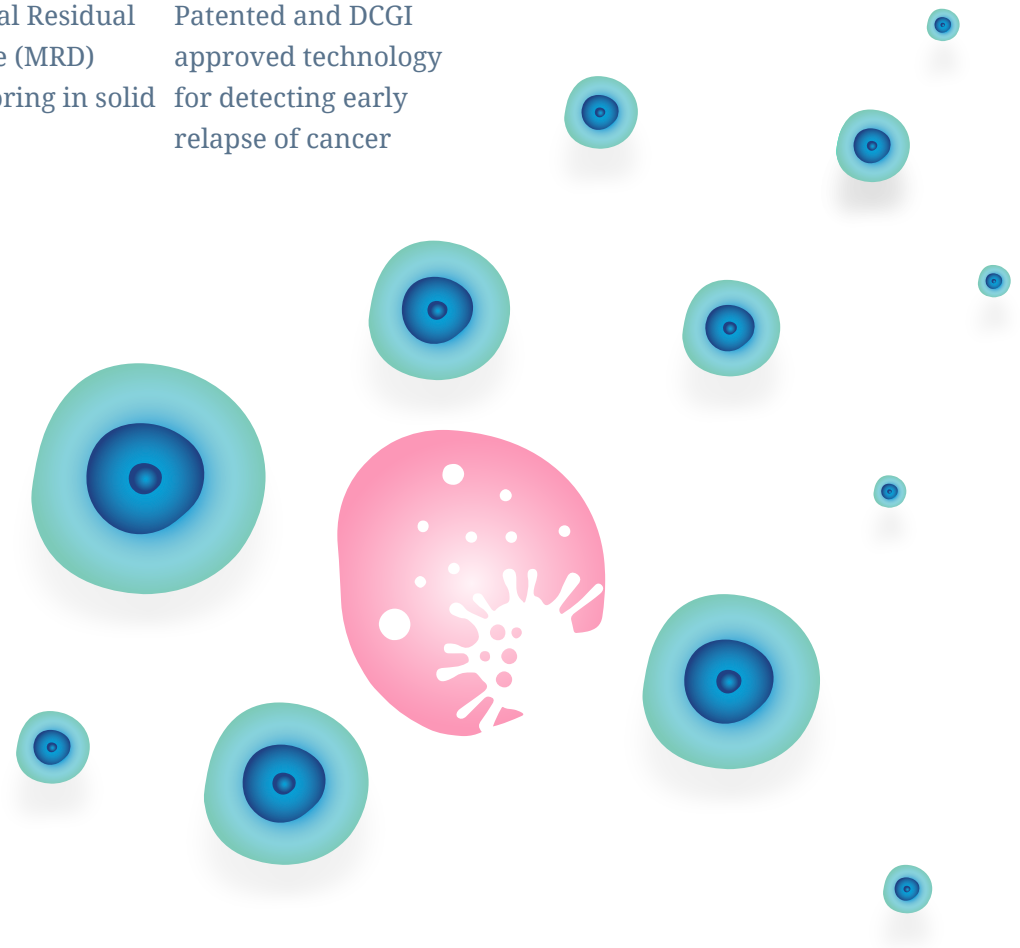
Fighting cancer. One cell at a time.

One in a billion cells

Prediction of treatment outcome through a simple blood test

Minimal Residual Disease (MRD) monitoring in solid tumor

Patented and DCGI approved technology for detecting early relapse of cancer



DCG(I) Approved
(License No. MFG/IVD/2019/000031)

ISO 13485:2016 Certified
(No.MD711748)

Patented
(International Application No. PCT/IB2016/050779)

Innovator of the Year - 2019
(Department of Biotechnology (DBT), GoI)

European / Indian Patent Granted; US Patent Pending

www.OncoDiscover.com

Background

Cancer is a systemic disease and its management adds immense physical, psychological, and economic duress to the patient. A cancer progression, treatment response and relapse not registered on time can be distressing to the patient and his family. Cancer detected at an early stage still requires appropriate monitoring to ensure the non-metastatic state after successful therapy. Unfortunately, often cancer is detected at the advanced stage and the treatment options remain very limited at this point. The monitoring of the treatment response related to the disease progression or regression becomes essential as it decides the outcome. The epitome of cancer suffering is metastatic spread, which results in more than 90 % of mortalities related to cancer. Appropriate prediction of a metastatic onset can prolong the patient's life and result in a favourable disease outcome. Often, for patients clinically declared disease free, eventually, the disease relapses due to tumor dormancy, which accounts for the minimal residual disease (MRD). Timely detection of MRD often yields a positive disease outcome for the patient.

Circulating Tumor Cells (CTC): originate from primary tumors as they shed into the bloodstream and are known to play a key role in metastatic cascade (Figure 1). CTCs survive in the systemic circulation and carry information on tumor heterogeneity and activate tumor formation at distant organs. During this process, these cells, transit into epithelial to mesenchymal transition (EMT). Thus CTCs can acquire migratory and invasive capacity and later invade the surrounding stroma leading to the progression of disease ('seed and soil' hypothesis by Paget).

CTCs have been investigated as **diagnostic, prognostic,** and **predictive biomarkers** in many types of solid tissue adenocarcinomas. The presence of even one CTC in a cancer patient's blood is associated with an **unfavorable prognosis** at any stage of cancer patients.

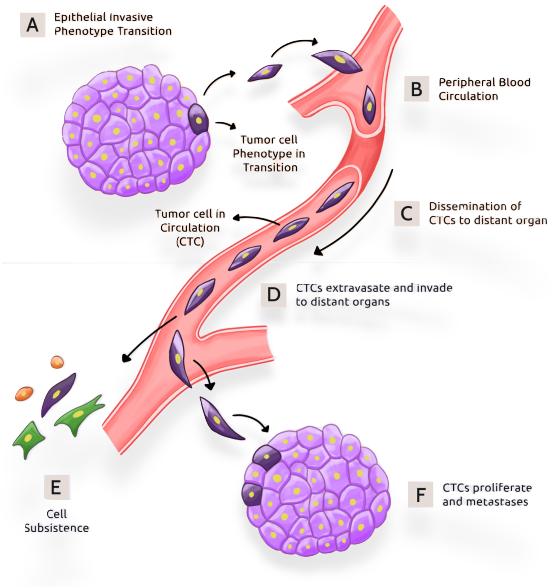


Figure 1: CTC transitions from primary to distant organs.

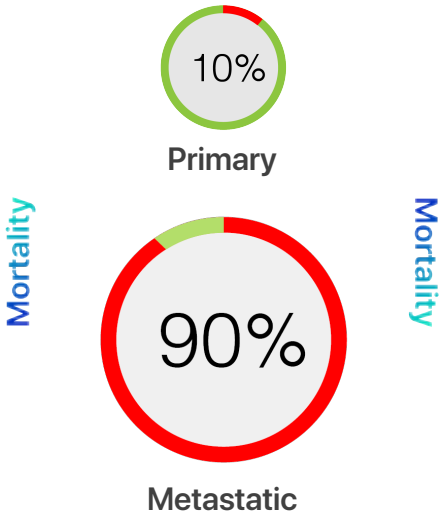


Figure 2: Comparative cancer related mortality rates- primary vs metastasis.

Background

Thus, detecting circulating tumor cells (CTCs) can provide a tell-tale signature for the disease progression, treatment decision, monitoring treatment outcome, presence of **Minimal Residual Disease (MRD)**, and predicting early relapse. CTCs have been extensively studied biomarker as a prognostic, and predictive cellular biomarker in many epithelial-originated cancers, for example, prostate, breast, lung, colorectal, ovarian, bladder, head, and neck, etc.

CTC clusters: are defined as groups of two or more aggregated CTCs found in the blood of patients with solid tumors. CTC clusters have a greater **survival advantage** over individual CTC during their transit in the bloodstream. They are associated with an order of magnitude of **potential for colonization (50 times higher compared to CTCs)** in distant sites for metastasis.

Challenges in Cancer Treatment

In clinical settings, it is difficult to follow the 'progression of the disease' or 'treatment response' in real-time at the cellular and genetic levels. This is primarily due to the inability of diagnostic imaging to reliably register the tumor heterogeneity at the fundamental level (cellular level). The changes in tumors often remain unobserved unless their clinical manifestation is realized. By that time the disease has already advanced and primary malignancy often transforms into metastasis. Additionally, in a clinical scenario, there is a huge gap in the detection of MRD and cancer relapse. It is well known established that about 90% of cancer-related mortality is due to metastasis (Figure 2).

1. **Tumor Dynamic Evolution:** After the diagnosis of cancer and subsequent initial therapy (first-line treatment), the tumor undergoes dynamic changes. Although successful, this therapy induces biological changes in tumor cells that lead to resistance and thus lead to failure of the therapy. Unfortunately, in current clinical settings, no diagnostic tests or radiographical imaging can reliably predict the therapy response and hence the evolution of tumor resistance.
2. **Minimal Residual Disease:** The enigmatic existence of a few of the primary tumor cells after initial therapy is a severe problem and leads to cancer relapse. These persisted cells maintain cancer at an occult stage as a minimal residual disease. Current clinical modalities are unable to detect this occult state of the disease and in 90 % of such cases, cancer relapses and the disease progresses more aggressively due to resistance to the first line of therapy.
3. **Metastatic Disease Relapse:** The risk of metastatic relapse weighs profoundly on the minds of patients, clinicians, and family members for years after completing the treatment for the primary tumor. Repeated monitoring for cancer relapse (local, regional or distant) among such individuals presents a significant challenge. Current American Society of Clinical Oncology (ASCO) and National Comprehensive Cancer Network (NCCN) guidelines limit follow-up care to medical history, physical exam, and occasional imaging stating that "in the absence of physical signs and symptoms suggestive of recurrent disease, there is no indication of laboratory or imaging studies for metastases screening". Despite this, most patients often receive high-cost imaging analyses (PET, MRI, or CT scans) during routine follow-ups. Simple non-invasive blood tests like OncoDiscover can detect CTCs in blood, i.e. monitor disease progression and detect the disease relapse with sensitivity at the cellular level eliminating the radiological imaging exposures.

Our Solution

The aforesaid critical problems of cancer management can be minimized using a 'real-time' blood test that is highly specific, efficient, and non-invasive. Actorius Innovations and Research has developed the OncoDiscover® blood test for CTC detection, prognostication, surveillance, and prediction of cancer relapse of epithelial origins. OncoDiscover is indigenously developed and in accord with the 'Atmanirbhar Bharat' program of the Government of India. OncoDiscover blood test is the 'First in Class' Medical Device approved by the Drug Controller General of India (DCGI). OncoDiscover is a highly convenient, minimally invasive, and clinically validated test for 'real-time' monitoring of cancer disease status, treatment response, presence of MRD, and detecting metastatic relapse. Importantly this test is available to epithelial cancer patients across the globe at a one-tenth cost of a similar test in the USA or Europe.

What is the OncoDiscover® blood test?

OncoDiscover® CTC test is a patented in-vitro diagnostic test that is clinically tested, validated, and has regulatory approval from DCGI for detecting CTCs from cancer patient blood. This simple blood test has critical applications in early cancer screening, monitoring disease progression and treatment response, and detecting MRD and metastatic relapse. The OncoDiscover® CTC test is built on the backbone of proprietary multi-component magnetic nanoparticles functionalized with ligands that bind to cell surface molecules expressed on epithelial cancer cells with high selectivity. CTCs attached to these particles are subsequently magnetically captured and separated. The isolated CTCs are immune-stained with epithelial-specific markers (CK18/19) along with the nuclear stain and imaged using a motorized and automated fluorescence microscope and the data is analyzed using an automated data processing pipeline.

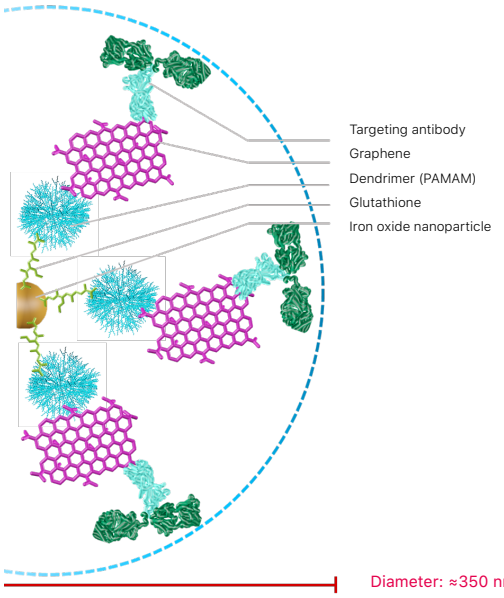


Figure 3: OncoDiscover Technology platform with anti EpCAM antibody.

Clinical benefit of OncoDiscover® CTC test: Case Studies
(Refer Table 1)

The OncoDiscover blood test is useful to provide multifaceted information about the cancer progression and the outcome of the disease. Considering the uncertainty of cancer progression and treatment response, and various difficulties with the endpoint determination based on imaging modalities. CTCs are viable biomarkers to understand the disease status and for its better management. In alignment with the above problems, the OncoDiscover CTC test can provide information on the following important attributes:

- **Cancer progression:** OncoDiscover test is useful to longitudinally monitor the progression (or regression) of cancer-based on CTCs count from the patient's blood (Figure 4). CTCs number correlates well with the advancement of the disease and adverse pathophysiological features. Therefore, monitoring the CTC number can predict the progression of the disease. Recently, through the largest clinical trial on Head and Neck cancer patients in the Indian population, we have demonstrated the utility of OncoDiscover technology to monitor the disease state and progression in treatment naïve patients and predict their survival endpoints. Our validation studies have strongly suggested that CTC counts obtained by the OncoDiscover test can be an independent factor for the pathological stage of head and neck cancers (Ref. Jayant Khandare, Pankaj Chaturvedi et al., Oral and Maxillofacial Pathology, OOOO, 134, 73-83, 2022).

ORAL AND MAXILLOFACIAL PATHOLOGY OOOO
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Circulating tumor cells as a predictor for poor prognostic factors and overall survival in treatment naÿve oral squamous cell carcinoma patients

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Objective. The aim of this study was to investigate the presence of circulating tumor cells (CTCs) and their correlation with prognostic factors and clinical outcomes in treatment-naive patients with oral squamous cell carcinoma.
Study Design. CTCs were isolated using OncoDiscover technique from presurgically obtained peripheral blood of 152 patients with treatment naïve oral squamous cell carcinoma. Sensitivity analysis was performed by including 40 healthy controls. CTCs cutoff values for clinicopathologic factors were obtained from receiver operating characteristic curves. Multivariate models determined the significance of CTC as independent variables. Kaplan-Meier analysis differentiated in overall survival between CTC values corresponding to the stage.
Results. Sensitivity, specificity, and accuracy of CTC detection were 94.32%, 98%, and 95.17%, respectively. Platform differentiated true positives at >3.5 CTCs ($P < .00001$). CTCs above 20.5 were suggestive of nodal metastasis ($P < .0001$) with a linear trend for detecting occult metastasis ($P = .061$). Early and advanced stages could be differentiated by >13.5 CTCs ($P < .0001$). Elevated CTCs were significantly associated with extranodal extension (>21.45 CTCs, $P = .025$), perineural invasion (>19.35 CTCs, $P = .049$), and depth of invasion (>12.5 CTCs, $P = .0038$). Median survival was reduced by 19 months when CTCs were >13.
Conclusions. Preoperative CTC levels demonstrated a strong correlation with adverse clinicopathology factors and suggested its role as a sensitive prognostic marker to predict survival outcome and disease progress. (Oral Surg Oral Med Oral Pathol Oral Radiol 2022;134:73–83)

Ref. Burhanuddin Qayyumi, Atul Bharde, Gourishankar Aland, Alain D'Souza, Sreeja Jayant, Nitin Singh, Swati Tripathi, Reecha Badave, Narendra Kale, Balram Singh, Smriti Arora, Isha Gore, Arjun Singh, Aravindan Vasudevan, Kumar Prabhash, Jayant Khandare and Pankaj Chaturvedi, Oral and Maxillofacial Pathology, OOOO, 134, 73-83, 2022).

- **Monitoring treatment response:** (Case Studies- Refer Table): OncoDiscover blood test predicts the treatment response with high accuracy. Positive treatment response can result in regression of the tumor and show a strong association with decreasing CTC number. While a non-responsive tumor keeps shedding the growing number of CTCs, as cancer advances and shows metastatic spread. The efficacy of the OncoDiscover test is evident from real-life cases to impact the treatment decisions. For example, in triple negative metastatic and locally advanced breast cancer patients, the CTC outcomes were vital to determine the course of the treatment. Similarly, in stage IV lung cancer patients, a change in the treatment from cytotoxic therapy to the targeted therapy resulted in a better outcome for the patients. Another example is of a stage IV ovarian cancer patient resulting in a positive outcome based on the OncoDiscover test to monitor CTCs. The dynamic output of the OncoDiscover test was decisive to alter the treatment course to a PARP inhibitor therapy.

- **The onset of metastatic disease relapse:** OncoDiscover CTC test is capable to predict metastatic disease relapse. At present, predicting metastatic disease relapse through traditional clinical modalities is unreliable and a chance outcome. The relapse is confirmed by imaging methods (PET, MRI), and by then the disease has already spread to distant body parts. After successful completion of therapy and no clinical evidence for the disease, longitudinal monitoring of CTCs can be a viable alternative to predict metastatic relapse. OncoDiscover test is useful to detect and monitor CTCs dynamics in patients who have been observed to be disease free. In multiple clinical cases of colorectal cancer, the OncoDiscover test detected the presence of metastatic relapse at a very early stage. Patients treated with CTRT and subsequently declared clinically disease-free showed the presence of CTCs. Careful examination of these patients indeed indicated metastatic relapse in the liver.

- **Detection of Minimal Residual Disease:** One of the reasons for cancer relapse is MRD and current clinical modalities do not effectively detect its presence. OncoDiscover CTC test is capable to detect MRD based on CTC count at the end of initial therapy. The incremental rise in CTC numbers from the baseline is an indication of the presence of a residual disease, which needs to be monitored critically for relapse. OncoDiscover test is becoming instrumental to monitor MRD in colorectal, ovarian, breast, lung, and head and neck cancer patients. An increase in CTC number from baseline values indicated the presence of MRD in these patients, who were subsequently treated appropriately for favourable outcomes.

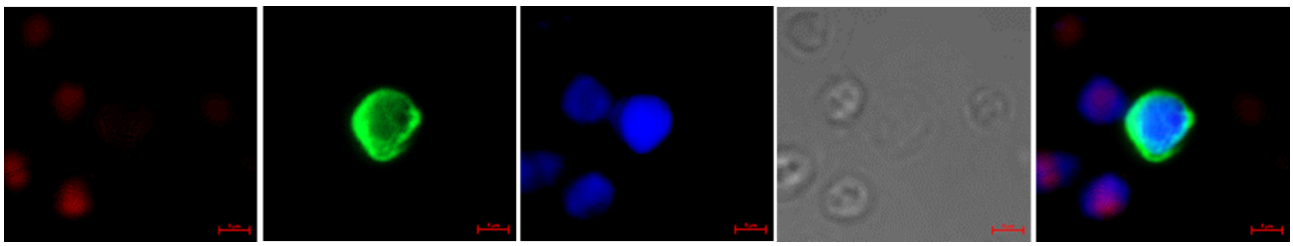


Figure 4: CTC was captured from a cancer patient's blood sample using the OncoDiscover platform.

Patient Name	Sex/Age	CTC (Baseline)	CTC 1	CTC 2	Cancer | Stage | Sub type	Stage, Previous RX	Current Rx	Further plan	Impact
Patient #1	F/	2	2	0	Ca rectum	Sx, radiation, chemo	Folfiri x 2	SIRT	Liver Mets found by MRI. Treated with SIRT
Patient #2	F/	2+ 1CC	0	-	LABC TNBC	sx ct rt	capecitabine	f/u 3 m	Positive response to treatment
Patient #3	F/	3	-	-	Locally advanced breast cancer	HR+, HER2-, ki-67-14-18%	Tamoxifen x 1month	Tamoxifen x 2months	Change in treatment duration
Patient #4	F/	2	-	-	ca ovary stage IV	NACT-Sx-Adj Ct	liposomal doxorubicin	Parp inhibitors	Treatment changed
Patient #5	F/	1	-	-	ca ovary HGSOC Stage IIIC	NACT-Sx-Adj Ct	liposomal doxorubicin x 3# till dec 20	oral metronomic chemo	Treatment changed
Patient #6	F/	3	1	0	Ca Left lateral border tongue, borderline operable	NACT	Afatanib + Methotrexate + Celecoxib	f/u 3 m	Positive response to treatment. Surgery Avoided
Patient #7	M/	2	-	-	Lung Ca Stg 4 Adenoca	driver mutations negative	pacli+carbo+bev - progressed	afatinib	Treatment changed
Patient #8	F/41	1	1	-	Ca rectum	Rt #5, Capox CT #3, Sx , CT Capox #5	on observation	Oral capecitabine	Liver Mets found by MRI. Patient on Oral CT
Patient #9	F/55	2	-	-	ca Ovary Stg III	NACT, Sx done	Paclitaxol + Caboplatin (3# completed)	Maintenance treatment	Treatment changed
Patient #10	F/74	4 + 1CC	-	-	Ca breast, ER+ve, PR+ve, pT2 N0	surgery	hormonal therapy	Add chemotherapy	Treatment changed

- **Information on actionable cancer markers:** The next generation of cancer therapeutics is focused on the cancer cell targets and for its effective administration. Hence detecting the presence of these actionable targets on tumor cells is vital. These targets are usually determined from a tissue biopsy by immunohistochemistry. However, tumors are evolving and it is impractical to perform multiple biopsies over time for qualitative and quantitative analysis of the targets. Additionally, initial therapy administered after biopsy may alter the expression of actionable targets in tumors. Besides capturing and detecting CTCs, OncoDiscover technology enables real-time detection of important actionable targets (e.g. PD-L1, EGFR, and HER2) on CTCs surfaces. Determining qualitative and quantitative aspects of actionable targets using OncoDiscover CTC test can significantly facilitate the targeted therapy decision for its effective outcome. At present OncoDiscover technology can detect the presence of actionable targets such as PD-L1, EGFR, and HER2 on CTCs obtained from colorectal, lung, and breast cancer patients, respectively.

Advantages of the OncoDiscover® blood biopsy test for CTC detection and enumeration.

Prognostic Evaluation (Figure 5): CTCs can be used as a predictor for poor prognostic factors and overall survival in treatment naïve oral squamous cell carcinoma (OSCC) patients.

Outcomes:

- High sensitivity, specificity, and accuracy for CTC detection.
- > 20.5 CTCs suggestive of pathological nodal metastasis with the linear trend for detecting occult metastasis.
- Early (I/II) and advanced (III/IV) stages were differentiated by > 13.5 CTCs.
- Elevated CTCs significantly associated with extra-nodal extension, perineural invasion, and depth of invasion.
- Median survival for OSCC patients was reduced by 19 months when CTCs were > 13.

Conclusion:

Preoperative CTC levels in treatment naïve OSCC patients demonstrated a strong correlation with adverse clinicopathology factors and are indicative of a sensitive prognostic marker in predicting survival outcome and disease progression.

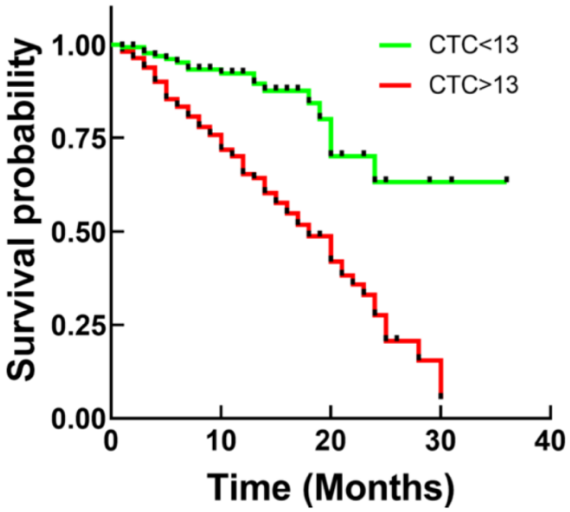


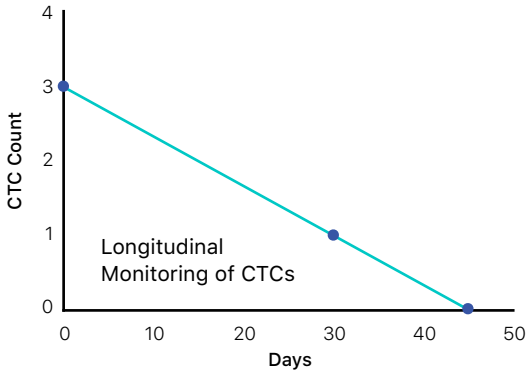
Figure 5: CTC as a predictor of OS in treatment naïve (at the time of blood draw) OSCC patients. Patients having more than 13 CTCs / 1.5. ml blood show significantly lower median OS compared to those with less than 13 CTCs.

Longitudinal Disease Monitoring and Treatment Decisions

CTC enumeration using the OncoDiscover® test can be used for longitudinal disease monitoring and guide treatment decisions.

Case Study:

Patient Gender:	Female
Patient Age:	80 Year
Cancer Type:	Oral Cancer
Treatment Regimen:	The patient was advised surgery but refused. Patient on Oral metronomic chemotherapy (OMC) (Methotrexate, Gefitinib, Celecoxib



Day	CTC Count
0 (Baseline)	3
30	1
40	0

Outcome:

The patient exhibited a complete response to OMC, which was corroborated by a reduction in CTC numbers.

Minimal Residual Disease (MRD) Surveillance and Detection

Routine CTC testing by OncoDiscover technology can be used for MRD surveillance and detection of occult metastatic niches that may go undetected by current clinical imaging techniques. Early therapeutic intervention based on OncoDiscover test assessments has improved patient survival outcomes.

Case Study: (Figure 6)

Patient Gender:	Female
Patient Age:	65 Year
Cancer Type:	Rectum cT3N2
Treatment Regimen:	NACT Folfirinox; CT + RT (Long Course) Sx (TRG2); Capox x 4# Gr2 PN (Oral Capecitabine)
Post Treatment Test:	The patient was **-ve** on PET Scan. 2 CTCs detected in the patient blood. Liver MRI indicated **multiple lesions of 4–6 mm, which were found in Seg IV/VIII.**
Treatment Decision:	The patient was advised Selective Internal Radiation Therapy (SIRT) to mitigate liver lesions.

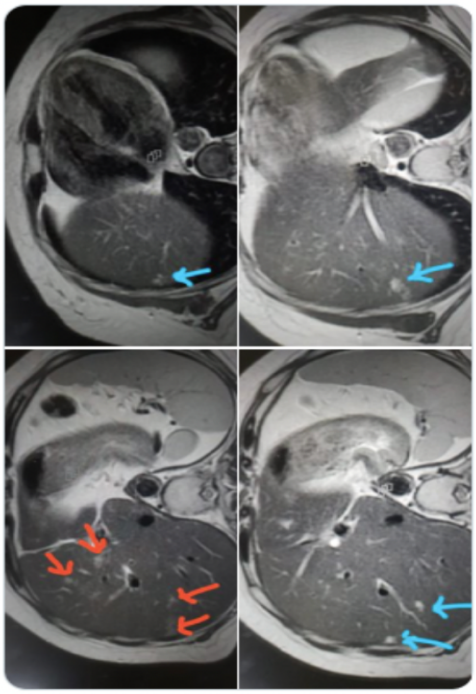


Figure 6: Liver MRI indicating metastatic lesions

Outcome:

The patient underwent SIRT on advice. Post-treatment MRI did not indicate the presence of metastatic lesions in the liver. CTCs were not detected after SIRT.

Detecting the presence of actionable cancer targets on CTCs surface (Figures 7-9).

OncoDiscover test can detect the expression of actionable markers on the CTC surface to facilitate immunotherapy and targeted therapy-based decisions. At present, the OncoDiscover technology provides information on the expression of PD-L1 marker to enable decisions on the administration of immune checkpoint blockade therapy. Similarly, OncoDiscover test offers detecting targets for administering tyrosine kinase (EGFR and HER2) inhibitor therapy.

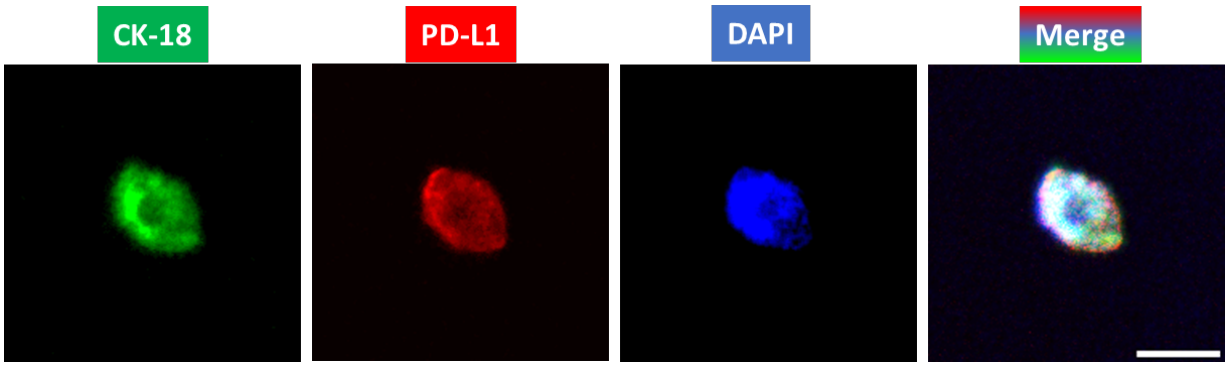


Figure 7: ***OncoDiscover Circulating Tumor Cells test with PD-L1*** *expression on cancer cells. These circulating cells have a survival advantage overcoming immune responses and promote aggressive initiation of metastasis. (Scale bar 20 µm).*

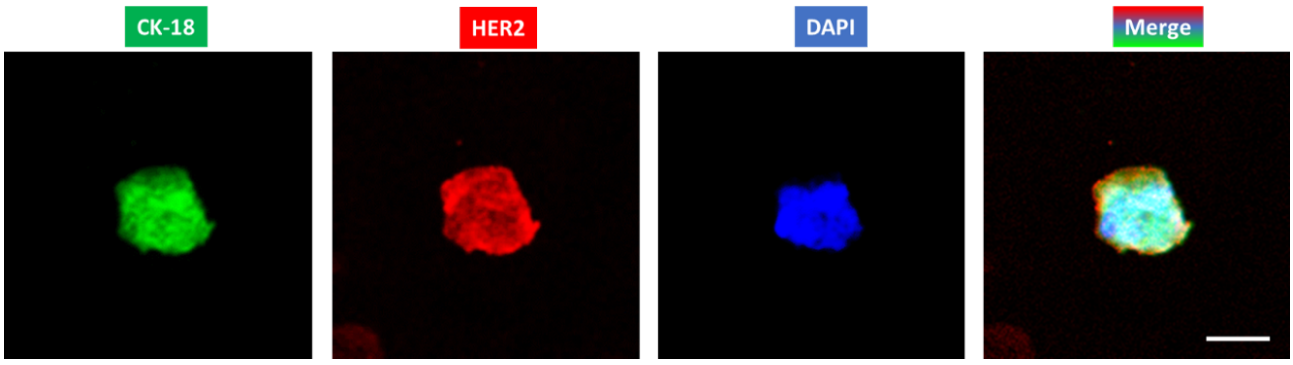


Figure 8: ***HER2 gene*** *is overexpressed in 10-30% of invasive MBCs. HER2 is favourable predictor for OS, following treatment and is a target for anti-HER2 immunotherapy. OncoDiscover platform extends differential cells with HER2 gene expression leading to more predictive therapy and outcome. (Scale bar 20 µm).*

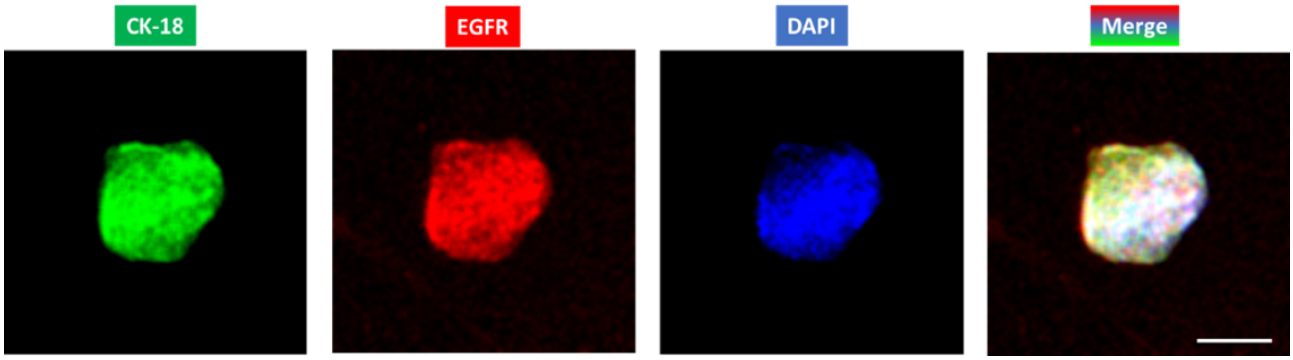


Figure 9: ***EGFR overexpression*** *and mutations are associated across many types of epithelial cancer. This tyrosine kinase receptor plays a key role in aggressiveness, metastasis and drug resistance. OncoDiscover test extends detection of EGFR expression on CTCs obtained from a variety of epithelial cancers. (Scale bar 20 µm).*

Publications

Meeting Abstracts 2022 ASCO ANNUAL MEETING

Machine learning (ML)–enabled, circulating tumor cell–based classification of patients for non-prerequisite adjuvant therapy.

Meeting	2022 ASCO Annual Meeting
Session Title	Care Delivery and Regulatory Policy: Poster Session
Track	Care Delivery and Regulatory Policy
Sub Track	Care Delivery and Regulatory Policy
Citation	J Clin Oncol 40, 2022 (suppl 16; abstr 1547)
DOI	10.1200/JCO.2022.40.16_suppl.1547
Abstract #	1547
Poster Bd #	140

Authors
Gowhar Shafi, Aarthi Ramesh, Krithika Srinivasan, Atul Bharde, Burhanuddin Qayyumi, Gourishankar Aland, Sreeja Jayant, Alain D'Souza, Aravindan Vasudevan, Mohan Uttarwar, Pankaj Chaturvedi, Jayant Khandare.

Meeting Abstracts 2022 ASCO ANNUAL MEETING

A feasibility study of EMF(erlotinib+methotrexate+5-fluorouracil) regimen in recurrent head and neck squamous cell carcinoma (HNSCC) and role of circulating tumour cells(CTCs) in assessment of outcomes.

Meeting	2022 ASCO Annual Meeting
Session Title	Head and Neck Cancer: Publication Only
Track	Head and Neck Cancer
Sub Track	Head and Neck Cancer
Citation	J Clin Oncol 40, 2022 (suppl 16; abstr e18038)
DOI	10.1200/JCO.2022.40.16_suppl.e18038
Abstract #	e18038

Authors
Annie Baa, Raja Pramanik, Atul Sharma, Ahitagni Biswas, Sachidanand JeeBharti, Mayank Singh, Rajeev Kumar, Aland Gourishankar, Sreeja Jayant, Alain D'Souza, Vikas JADHAV, Jayant Khandare.

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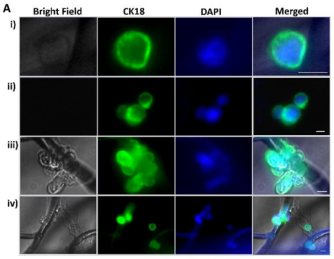

Journal of Materials Chemistry B
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REVIEW
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Chemo-specific designs for the enumeration of circulating tumor cells: advances in liquid biopsy

Balram Singh, †[a] Smriti Arora, †[a] Alain D'Souza, [a] Narendra Kale, [a] Gourishankar Aland, [a] Atul Bharde, ‡[a] Mohiuddin Quadir, [b] Marcelo Calderón, [cd] Pankaj Chaturvedi [a] and Jayant Khandare [a]

ANNALS OF ONCOLOGY
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ABSTRACT ONLY | VOLUME 32, SUPPLEMENT 6, S1354, OCTOBER 01, 2021

28P Validation of cytokeratin (CK18) protein expression in epithelial cell lines and in circulating tumor cells (CTCs)

N.V. Raut • N. Kale • A. d'Souza • ... K. Prabhash • P. Chaturvedi • J. Khandare • Show all authors

DOI: https://doi.org/10.1016/j.annonc.2021.08.2024

Meeting Abstracts 2020 ASCO ANNUAL MEETING

Device for the enumeration and continuous removal of circulating tumor cells in improving overall survival of epithelial cancer patients.

Meeting	2020 ASCO Virtual Scientific Program
Session Title	Publication Only: Developmental Therapeutics—Immunotherapy
Track	Developmental Therapeutics—Immunotherapy
Sub Track	Developmental Therapeutics—Immunotherapy
Citation	J Clin Oncol 38: 2020 (suppl; abstr e15043)
DOI	10.1200/JCO.2020.38.15_suppl.e15043
Abstract #	e15043

Authors
Jayant Khandare, Smriti Arora, Balram Singh, Alain D'Souza, Nitin Singh, Narendra Kale, Shubham Bhide, Amrut Ashturkar, Aravindan Vasudevan, Gourishankar Aland

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Abstract B30

AACR American Association for Cancer Research
FINDING CURES TOGETHER

Clinical correlation of circulating tumor cells as a blood marker in Indian head and neck cancer patients

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Meeting Abstracts 2022 ASCO ANNUAL MEETING

Extracorporeal microchannel device to capture and eliminate circulating tumor cells from cancer patient's blood.

Meeting	2022 ASCO Annual Meeting
Session Title	Developmental Therapeutics—Immunotherapy: Publication Only
Track	Developmental Therapeutics—Immunotherapy
Sub Track	Developmental Therapeutics—Immunotherapy
Citation	J Clin Oncol 40, 2022 (suppl 16; abstr e14522)
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Abstract #	e14522

Authors
Jayant Khandare, Alain D'Souza, Smriti Arora, Balram Singh, Gourishankar Aland, Narendra Kale, Isha Gore, Arnav Deshmukh, Rick Kamble, Vikas JADHAV, Pankaj Chaturvedi.

Meeting Abstracts 2022 ASCO ANNUAL MEETING

Circulating tumor cells as a biomarker for monitoring: Disease progression, treatment response, and minimal residual disease.

Meeting	2022 ASCO Annual Meeting
Session Title	Developmental Therapeutics—Molecularly Targeted Agents and Tumor Biology: Publication Only
Track	Developmental Therapeutics—Molecularly Targeted Agents and Tumor Biology
Sub Track	Developmental Therapeutics—Molecularly Targeted Agents and Tumor Biology
Citation	J Clin Oncol 40, 2022 (suppl 16; abstr e15021)
DOI	10.1200/JCO.2022.40.16_suppl.e15021
Abstract #	e15021

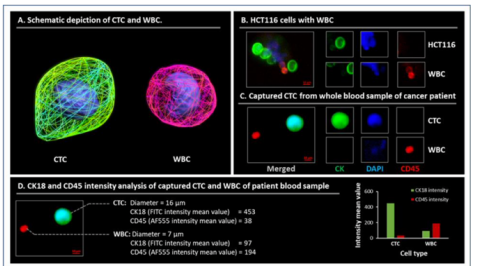
Authors
Nirmal Vivek Raut, Atul Bharde, Aland Gourishankar, Sreeja Jayant, Meghana Garbhe, Sayali Gosavi, Apoorva Janorkar, Alain D'Souza, Aravindan Vasudevan, Jayant Khandare.

Meeting Abstracts 2022 ASCO ANNUAL MEETING

Correlation of circulating tumor cells as a positive interventional biomarker in cancer patients.

Meeting	2022 ASCO Annual Meeting
Session Title	Developmental Therapeutics—Immunotherapy: Publication Only
Track	Developmental Therapeutics—Immunotherapy
Sub Track	Developmental Therapeutics—Immunotherapy
Citation	J Clin Oncol 40, 2022 (suppl 16; abstr e14527)
DOI	10.1200/JCO.2022.40.16_suppl.e14527
Abstract #	e14527

Authors
Jayant Khandare, Gourishankar Aland, Sreeja Jayant, Pratim Chakraborti, Alain D'Souza, Avinash Kadam, Poonam Birari-Gawande, Yogesh Narayan Bendale.



2021 ASCO ANNUAL MEETING
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Circulating tumor cells demonstrate a positive biomarker in head and neck squamous cell carcinoma (HNSCC) in tobacco consuming population of Bangladesh.

Meeting	2021 ASCO Annual Meeting
Session Title	Publication Only: Head and Neck Cancer
Track	Head and Neck Cancer
Sub Track	Head and Neck Cancer
Citation	J Clin Oncol 39, 2021 (suppl 15; abstr e18011)
DOI	10.1200/JCO.2021.39.15_suppl.e18011
Abstract #	e18011

Authors
Alain D'Souza, Muhammad Mosaraf Hossain, Sreeja Jayant, Isha Gore, Pratim Chakraborti, Aland Gourishankar, Balram Singh, Smriti Arora, Swati Tripathi, Nitin Singh, Reecha Badave, Mohammad Ali Asgar Chowdhury, Rajib Kumar Shil, Shafiqul Islam, Ridwan Ahmed, Mohit Majumder, Srikanta Chowdhury, Abu Shadat Mohammod Noman, Pankaj Chaturvedi, Jayant Khandare

Meeting Abstracts 2020 ASCO ANNUAL MEETING

Correlation of CTCs with disease progression in Indian oral cancer patients.

Meeting	2020 ASCO Virtual Scientific Program
Session Title	Publication Only: Developmental Therapeutics—Molecularly Targeted Agents and Tumor Biology
Track	Developmental Therapeutics—Molecularly Targeted Agents and Tumor Biology
Sub Track	Developmental Therapeutics—Molecularly Targeted Agents and Tumor Biology
Citation	J Clin Oncol 38: 2020 (suppl; abstr e15541)
DOI	10.1200/JCO.2020.38.15_suppl.e15541
Abstract #	e15541

Authors
Jayant Khandare, Burhanuddin Qayyumi, Atul Bharde, Gourishankar Aland, Sreeja Jayant, Swati Tripathi, Nitin Singh, Reecha Badave, Alain D'Souza, Balram Singh, Smriti Arora, Narendra Kale, Aravindan Vasudevan, Amrut Ashturkar, Kumar Prabhash, Pankaj Chaturvedi

Meeting Abstracts 2019 ASCO ANNUAL MEETING CARING FOR EVERY PATIENT, LEARNING FROM EVERY PATIENT

A highly efficient, low-cost, novel multicomponent nanosystem for rapid enumeration of circulating tumor cells.

Meeting	2019 ASCO Annual Meeting
Session Title	Developmental Therapeutics and Tumor Biology (Nonimmuno): Publication Only
Track	Developmental Therapeutics—Molecularly Targeted Agents and Tumor Biology
Sub Track	Developmental Therapeutics—Molecularly Targeted Agents and Tumor Biology
Citation	J Clin Oncol 37, 2019 (suppl; abstr e14516)
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Abstract #	e14516

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