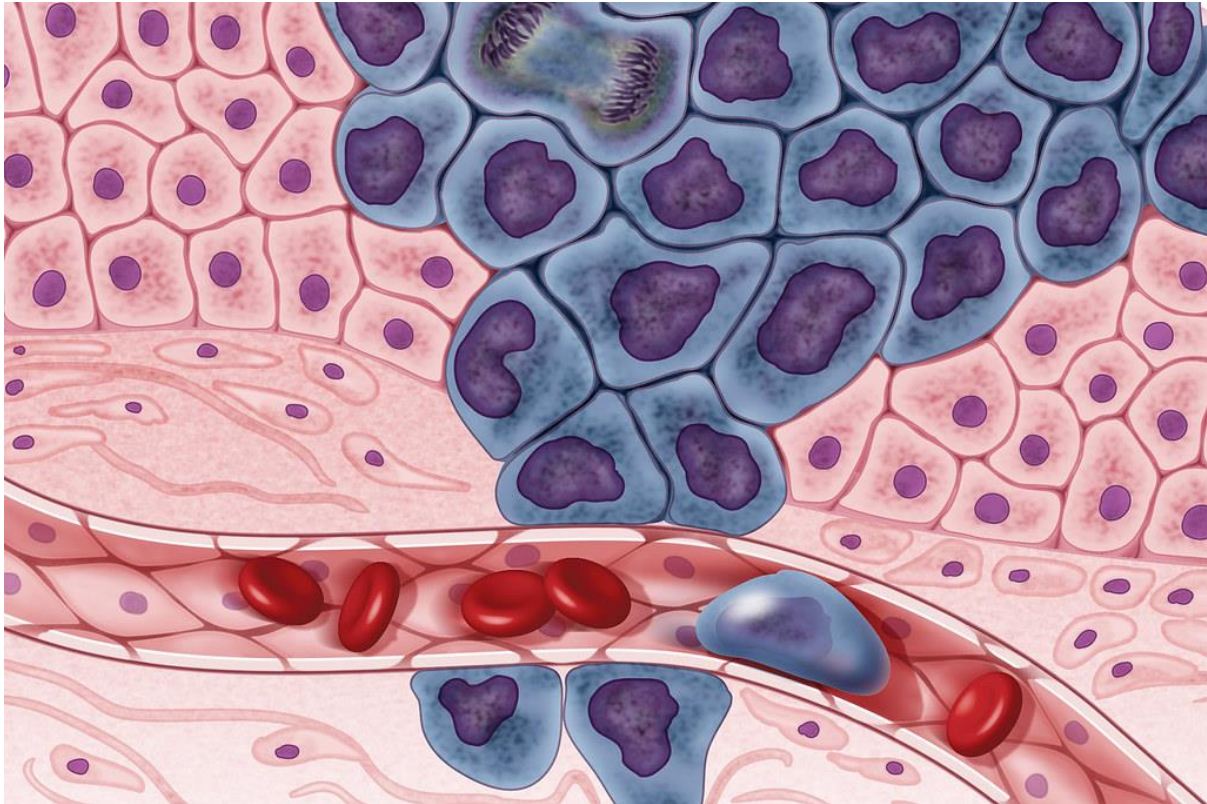


DBT-NIBMG scientists working to find cell types behind cancer recurrence

New Delhi, Aug 19: One of the major challenges in cancer treatment is tumour recurrence. Most patients initially respond well to therapy, but often for some, the tumours recur and cancer comes back after some time. The tumors that recur do not always respond well to the treatment as they did the first time, thus resulting in less chances of survival rate of cancer patients.



Tumour is a complex ecosystem consisting of several cell types and each shows a distinct transcriptomic profile i.e. have a different pattern of expression of the genes. The diversity within the tumour is called intra-tumour heterogeneity. Intra-tumour heterogeneity is increasingly appreciated as a determinant of treatment failure/recurrence and thus one of the main reasons for poor overall survival in cancer patients.

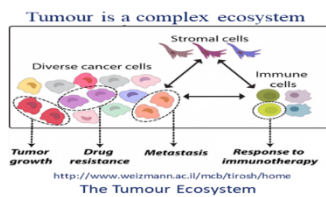
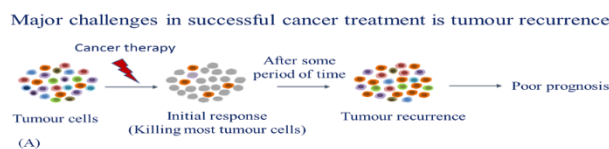
Oral squamous cell carcinoma gingivo-buccal (OSCC-GB), which is the most common cancer in men in India, is mostly diagnosed at advanced stages. Despite progress in treatment strategies, survival rate has not significantly improved over time. Tumour recurrence is common and is one of the major reasons for poor prognosis of OSCC-GB patients. There is an urgent need to understand the underlying mechanism of recurrence.

Recent advances in single-cell genomics provide opportunities to explore intra-tumour heterogeneity at single cell resolution. Single-cell RNA-sequencing (scRNA-seq) studies in many human cancers have revealed new insights into tumour heterogeneity and distinct subpopulations, which are essential for dissecting tumour related mechanisms in detail.

Using single-cell RNA-sequencing, a team of researchers at the Department of Biotechnology's National Institute of Biomedical Genomics (DBT-NIBMG), Kalyani, have generated single cell RNA sequence profiles for primary tumour by profiling thousands of cells from the primary tumour of OSCC-GB patients to identify the major cellular components and their features that could help in better understanding the behavior of a tumour and determine which of these features are associated with tumour recurrence.

The researchers observed cellular diversity within a tumour and between tumours in OSCC-GB that are characterized by different cell types with distinct gene expression profiles. Such diversity could influence response to therapy, recurrence and influence in inter-patient variability in survival period.

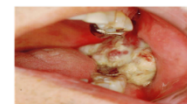
They are now characterizing these cells and their gene expression state to better understand the cell type and cell type specific gene expression profile that associates with tumour recurrence. Identification of dominant cell types and cell states in a subpopulation of OSCC-GB may help in stratifying patients that are most likely to recur for better treatment management that would improve the clinical outcome of the patient.



- The heterogeneity within a tumour:
 - Affect growth, response to therapy, metastasis and recurrence.
 - Influence inter-patient variability in survival period.

(B)

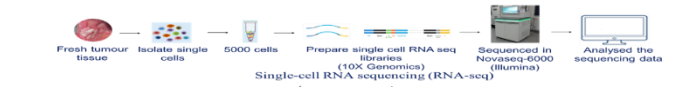
Oral squamous cell carcinoma gingivo-buccal (OSCC-GB)



- Most common cancer among men in India
- Characterised by:
 - High mortality and morbidity
 - Poor prognosis
 - High tumour recurrence

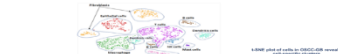
(C)

To identify the major cellular components and their features that associates with tumour recurrence, we generated scRNA-seq profiles for primary OSCC-GB tumours



OSCC-GB tumours were profiled

A Single-Cell Expression Atlas of OSCC-GB Primary Tumour



We are now characterization of the gene expression profile in OSCC-GB tumour

To identify what are the cell specific gene expression profile that associates with tumour recurrence



- Cellular diversity was observed in OSCC-GB tumour characterized by different cell types with distinct gene expression profile.
 - Identification of dominant cell type and cell states associated with tumour recurrence could improve the clinical outcome of patients.
- (D) • Such diversity could influence tumour recurrence.

Figure: Infographic of the work

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