Filtration, Identification and Applications of CTCs and Circulating Cancer-Associated Cells

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Outline

- CellSieve™ microfilter
- CTC
- Circulating giant cancer-associated cells
CellSieve™ Microfilter

Independent of CTC surface markers

- Uniform 7µm pore size and distribution
- Non-fluorescent
- Lay flat on glass slide
Filtration & Assay System

- **Rapid**
  - 3 min to filter 7.5 ml of blood

- **Straightforward work flow**
  - Entire enumeration assay can be performed in the filter holder

- **Small and large sample size**

- **Consistent flow**

- **Gentle - no cell damage**

- **Low cost instrument**
Assays of cells on the filter can be performed in the holder

Cells can be back washed out

**Single** cells can be picked off filter

Directly lysis of cells on filter

Sample types

- Blood
- Bone marrow
- Urine
- CSF
“True” CTCs
Criteria to improve specificity

- DAPI positive
  - and cancerous looking
- To identify CTC
  - CK 8, 18, 19 (+)
  - and filamentous pattern
- To eliminate blood cells
  - CD45 (-)

Cancers of mesenchymal origin require other markers.
Circulating Cancer Associated Macrophage-like Cells (CAMLs)

- Large atypical nucleus
- May express CK 8, 18 or 19 and EpCAM and
  CK and EpCAM are diffused
- Most of time CD45 positive
- Large: 20 - 300 µm
- Express CD11c, CD14
- Express endothelial markers CD146, TIE-2

“In press” open access PNAS, under embargo
Breast Cancer Patient

Merged

160 µm
Interactions of CAMLs with CTCs

- CAMLs engulfing CTCs – explain presence of marks in CAMLs
- Found in ~10% of patient samples
- Short survival
CAMLs with Ingested Markers

Prostate CAML

Pancreatic CAML

Merge  PSMA  Merge  PDX-1

80 µm
CAMLs More Prevalent than CTCs

Found even in stage I/II patients

- Not found in 36 healthy controls and 2 with benign disease
- CTCs are found only in some late stage patients
Clinical Utility of CAMLs

- Important to differentiate CTCs and CAMLs
  - They have different response to therapy

- CAMLs more prevalent than CTCs

- May provide rapid indication of effectiveness of therapy together with CTCs

- Predict survival

- Potential biomarker for screening at risk patients
  - Lung cancer
  - Pancreatic cancer
**Summary**

- **CellSieve™ microfilter**
  - Applicable to all types of CTC assays
  - Rapid and straightforward work flow
  - High sensitivity

- **Giant CAMLs**
  - More prevalent than CTCs
  - Many potential clinical applications
Thank you

ALL THE PATIENTS

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Thank you

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