Combining circulating tumor cells (CTCs) and circulating cancer associated macrophage-like cells (CAMLs) for accurately predicting responsiveness of new line therapies in late stage cancers

Daniel L. Adams1, Raymond C. Bergan2, R. Katherine Alpaugh3, Stuart S. Martin4, Martin J Edelman5, Rena Lapidus6, Saranya Chumsri7, Massimo Cristofanilli8, Cha-Mei Tang9, Steven H. Lin4

1 Creativ MicroTech, Inc., Monmouth Junction, NJ 08852, 2 Oregon Health and Sciences University, Portland, OR 97239, 3 Fox Chase Cancer Center, Philadelphia, PA 19111, 4 University of Maryland Greenebaum Cancer Center, Baltimore, MD 21201,
5 Mayo Clinic Cancer Center, Jacksonville, FL 32224, 6 Northwestern University, Robert H Lurie Cancer Center, Chicago IL 60611, 7 CREATIV MicroTech, Inc., Potomac, MD 20854, 8 MD Anderson Cancer Center, Houston, TX 77030

ABSTRACT

The discovery of cancer associated macrophage like cells (CAMLs) as independent prognostic indicators of survival has highlighted the need for more in depth analysis of blood based diagnostics. We have previously demonstrated that CAMLs are cancer specific giant macrophage cells circulating in the blood of patients which appear prognostic for overall survival (OS). Further, it is well established that circulating Tumor cells (CTCs) transit the circulatory system and are also prognostic for OS. As CTCs & CAMLs are isolated in parallel from a single blood sample and both are prognostic for therapy response, we hypothesized that monitoring CTCs & CAMLs before and after initiation of therapy might increase their prognostic value in a large array of cancer subtypes.

INTRODUCTION

CAMLs are specialized myeloid polyoid cells transiting the circulation of patients in various types of solid malignancies whose size increase is prognostic for survival. While CAMLs are easy to identify by their large size and polyoid nucleus, they appear to present as stem cell like phenotype with multiple heterogeneous epithelial, myeloid, and angiogenic markers. CTCs are cancer cells that originate from a primary solid tumor and are found transiting the circulatory system. While CTCs have been shown to an indicator of metastatic malignant disease and predict survival outcomes in late stage patients, CTCs are not detected in all disease stages and rare a number of cancers (e.g. NSCLC and Esophageal).

RESULTS

CTCs were identified in 21% of patients at BL and 23% at follow-up (FU) with both being prognostic for OS (Fig. 1).

- CTCs were rare in lung (6%), esophageal (4%) and prostate (24%), but common in breast (79%).

- CAMLs were common, found in 92% of BL samples and 98% of FU samples with both times being prognostic for OS (Fig. 1).

- After induction of systemic therapy, ≥1 CTCs or a ≥50µm CAML was highly prognostic for OS and 75% accurate at predicting OS over 24 months.

CONCLUSIONS

- In the first large scale prospective study on the clinical utility of CAMLs and CTCs, both cell types were prognostic for OS in invasive solid cancers.

- A single CTC at BL (Fig A) or FU (Fig C) was associated with poorer OS.

- A single ≥50µm CAML at BL (Fig B) or FU (Fig D) was also associated with poorer OS.

- In a multivariate analysis, CAML size was the most predictive variable for OS and independent of other clinical variables, while CTC presence was associated with metastasis.

- Simultaneous measurement of both CTCs and CAMLs may increase the prognostic value of blood based diagnostics and may be predictive of benefit of subsequent therapies.

REFERENCES


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