Cancer associated macrophage-like cells correlate with systemic therapy and pathological stage in numerous malignancies

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ABSTRACT

Blood based testing can be used as a non-invasive method to recover and analyze Circulating Tumor Cells (CTCs) from the blood of cancer patients for numerous clinical implications. Furthermore, we recently published preliminary data on the presence of an additional cell-based cancer biomarker, Cancer Associated Macrophage-Like cells (CAMLs). These cells were present in a variety of malignancies and were used to track both therapy response and cancer progression (Adams et al., PNAS 2014). This report is a continuation of that study, to identify and track CAMLs, with an emphasis on correlating pre-surgical clinical assessment and pathological confirmation from baseline samples.

INTRODUCTION

CAMLs are specialized myeloid cells transiting the circulation of patients in all stages of cancer. They are responsive to cancer treatment and are found in multiple cancer types. However, although previously observed by numerous groups, these cells have remained largely unstudied, and their clinical and biological value in malignancies remains uninvestigated.

Size exclusion is a technique for isolating large cells from peripheral patient blood irrespective of their surface marker expression. CellSieve™ microfilters are size exclusion membranes capable of rapidly and efficiently isolating both CAMLs and CTCs from whole blood, making it possible to study both cell types in conjunction with and in relation to malignant disease.

RESULTS

- CAMLs were identified in 98/105 samples (93%), ranging from 0-105 CAMLs per 7.5 ml blood sample.
- No CAMLs were found in 30 healthy controls [Sensitivity=93% (CI95% 87-97%) and Specificity=100% (CI95% 88-100%)].
- CAML number appeared dependent on both presence of malignancy and therapy type.
- For patients undergoing chemotherapy, the number of CAMLs had a weak association with pre-surgical clinical assessment: stage I (14.9 per sample), Stage II (13.7), Stage III (18.3), Stage IV (37.8); R²=0.74.
- For patients undergoing chemotherapy, the number of CAMLs were exponentially correlated with final pathological confirmation; stage I (3.2), Stage II (7.1), Stage III (14.6), Stage IV (35.1); R²=0.99.

CONCLUSIONS

- CAMLs are circulating immune cells specific to malignant disease.
- The number of CAMLs appears to depend on therapy type.
- The number of CAMLs in patients undergoing chemotherapy is weakly associated with pre-surgical clinical assessment and highly correlated with pathological confirmation.
- These findings indicate that CAMLs may be a valuable supplement to current screening and staging procedures.

REFERENCES