Retaining ALK Rearrangement in Cultured Circulating Tumor Cells Derived from Lung Cancer Patients

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Study Aim:
To investigate whether circulating tumor cells (CTCs) isolated and cultured from lung cancer patients retain the same ALK rearrangement status as found in the primary tumor tissue.

Methods:

- Isolated CTCs from blood samples of 4 lung cancer patients and cultured them for 16-18 days
- Characterized cultured CTCs using immunofluorescence and immunocytochemistry staining for epithelial (EpCAM) and leukocyte (CD45) markers
- Analyzed ALK rearrangement in cultured CTCs using real-time PCR
- Compared ALK status in cultured CTCs to FISH results from primary tumor tissue biopsies

Key Findings:

- Successfully cultured CTCs from lung cancer patients, with cells forming spheres from day 4
- About 30% of cultured cells were EpCAM+/CD45-, indicating CTC phenotype
- ALK rearrangement status in cultured CTCs matched FISH results from primary tumors in all 4 patients (3 positive, 1 negative)

Conclusions:

- Cultured CTCs retain the same ALK rearrangement status as primary tumors
- CTC culture could provide a non-invasive alternative to tissue biopsies for molecular analysis and monitoring of lung cancer
- This approach may enable serial sampling and analysis to guide treatment decisions over time
- Further optimization of culture conditions and CTC characterization methods is needed for clinical application

The study demonstrates proof-of-concept for using cultured CTCs as a "liquid biopsy" to assess ALK status in lung cancer patients, potentially offering a less invasive alternative to repeated tumor biopsies.