AB047. P-15. Using an integrated microfluidic platform to explore circulating tumor cells in cholangiocarcinoma

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Background: Cholangiocarcinoma (CCA) is the second most common primary hepatobiliary malignancy, with significantly increasing incidence in last two decades. Most patients are diagnosed late. Surgery still served as the mainstay treatment but early relapse. Circulating tumor cells (CTCs) have been detected by EpCAM-based capture method which has emerged as a promising biomarker in oncology. However, data regarding the application of the above in the detection of CTCs in CCA is scarce. Furthermore, there is an urgent need to develop a new capture probe for CCA.

Methods: An integrated microfluidic platform with the automatic functions of red blood cells (RBCs) lysis, isolation of pellets and depletion of white blood cells (WBCs) was applied. The CTCs were enriched with magnetic beads (MB) surface functionalized with anti-EpCAM and a novel glycosaminoglycan (SCH-45), followed by immunostaining with DAPI, CK17, and CD45 to distinguish CTCs from WBCs, in spiked blood samples and clinical blood samples from CCA patients.

Results: Using this integrated microfluidic platform, a CCA cell line, Huh28, was clearly bound onto both MB-SCH45 and MB-anti-EpCAM, with immunostaining of DAPI(+), CK17(+), and CD45(–). The average recoveries of the spiked cancer cells using MB-SCH45 and MB-anti-EpCAM, were experimentally found to be 77.8%±10.2% and 85.6%±14.4%, respectively. For thirty blood samples from patients with stages III–IV CCA, the new capture probe, SCH45, was capable of isolating CTCs in all samples, which seemed to be more specific when compared to the traditional EpCAM probe. The dynamic change of CTCs number was highly correlated with the response to chemotherapy prospectively in 5 patients with intrahepatic CCA.

Conclusions: This microfluidic system could detect CTCs in only 1 mL of blood, which only took 2.5 h. The new probe, SCH45, may serve as a potential biomarker for CTC isolation.

Keywords: Circulating tumor cells (CTCs); cholangiocarcinoma; microfluidic platform

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