

國立台灣大學技術行銷表

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產品/技術名稱	癌症轉移監測盤
發明人/單位	胡文聰(博士)、潘宇誠(碩士)、陳畊兆(博班生)、陳貞伶(博班生)/應力所
產品/技術說明	此正篩選微流碟片是利用免疫磁珠和多環磁鐵來分離稀少細胞。藉由改變轉速來改變離心力的大小，並且利用離心力來移動碟片中的液體。目標細胞在進入碟片之前會免疫磁珠結合，使目標細胞在碟片中可以被多環的磁鐵所捕捉。之後在碟片內進行細胞的偵測。在未來更有機會利用簡單的方式直接將目標細胞從碟片中取出，並進行細胞培養。
應用範圍	可應用於需要監測血液中特定細胞(具明確的免疫特徵)數量的任何臨床需求。如癌症轉移監測、過敏或是產前檢查。
產品/技術優勢	<p>近年來，分離的技術可以分為：螢光分離法(FACS)、介電分離法(DEP)、微結構分離篩選法、免疫磁珠分離法(MACS)。其中 FACS 和 MACS 是目前普遍被使用來分離和計算細胞的系統，可是 FACS 的價格較為昂貴，不易消毒，並且需要較多檢體。而 MACS 則容易造成細胞損失。</p> <p>在正篩選的微流碟片中，利用了免疫磁珠和免疫螢光來進行細胞的分離和偵測。其優點有結構簡單、成本較低、方便檢測、較少的細胞損失。</p> <p>Jean Paul Thiery 博士(法籍學者，目前在新加坡的實驗治療中心擔任 Chief Scientific Officer)表示一個有效的分離系統，其偵測靈敏度必須達到 10^{-7} 以上(即一顆特定細胞必須能在一千萬個細胞的混合液中被偵測到)。而此正篩選微流碟片系統不但可以達到 10^{-7} 等級的靈敏度，還有穩定的回收率。</p>
市場潛力	<p>近年來，稀少細胞在基礎研究和臨床上成為重要的課題，而且有很多的研究是有關於血液中的稀少細胞，並認為這些稀少細胞可以當作一些指標，例如：疾病診斷、治療效果的評估、疾病的監控...等等。將有利於開發阻斷癌轉移的藥物。</p> <p>臨床部份可望貢獻於癌症轉移監測、過敏或是產前檢查。相對於先前技術，我們有成本低廉與處理時間短的特色。即便無法完全取代先前技術，也應該能藉著普及化使用而打開市場。</p>
產品/技術 智財權保護方式	專理申請中

Marketing Abstract of NTU's Invention Disclosure

Title	Disk for monitoring metastasis
Inventor (s)	Andrew M. Wo; PAN, YU-CHENG; CHEN, KEN-CHAO; CHEN, CHEN-LIN
Brief Description	<p>The multi-stage magnet was used to separate rare cells labeled with immuno-beads in blood, on a microfluidic disk.. Via changing the rotational speed of the disk, centrifugal force, driving fluid with cells, was adjusted. Then the target cells were captured by multi-stage magnet in the inlet reservoir of disk. Detecting and counting rare cells can be performed in the disk.</p>
Fields of Application	<p>This can be used to separate and detect the specific cells with distinct immunological feature in the whole blood from patients. For example, monitoring metastasis of cancer and allergy, or prenatal diagnosis.</p> <p>The enumeration of circulating tumor cells (CTCs) in the peripheral blood or bone marrow of cancer patients might be useful to predict metastasis, estimate dosage of chemotherapy, and monitor recurrence after primary therapy.</p> <p>Another example is fetal cells from maternal blood. To extract 2-6 circulating fetal cells from 1 ml maternal whole blood is an alternative way to obtain fetal material for prenatal diagnosis without the considerable risks entailed by invasive procedures like amniocentesis or chorionic villus sampling.</p>

<p>Advantages</p>	<p>Recent separation technologies can be classified into fluorescence activated cell separation (FACS), dielectrophoresis (DEP), massively parallel microfabricated sieving device, magnetically activated cell separation (MACS), and additional manipulations including optics and acoustics. Among them, FACS and MACS are practically being used.</p> <p>Although the FACS system has been steadily being used, it requires relatively high cost, difficult sterilization, and need for a large sample volume.</p> <p>Contrary to the FACS, magnetically activated cell separation (MACS) is capable of enrichment of most target cells within a short time, and reducing the sample required for analysis. Various products (such as MACS of Miltenyi Biotec, Dynal MPC of Invitrogen, MagCelect of R&D system, EasySep of StemCell Technologies, BD IMag of BD Biosciences, etc.) have been commercially employed. Most of them separate and enrich cells in the column (Miltenyi Biotec) or tubes. It needs to transport the cells to slides or some platforms to detect. A high cell loss can occur in this process.</p> <p>The positive CD-based microfluidic system that integrates immunobeads separation with direct immunofluorophore for detection in the same platform. Advantages of this approach include simple fabrication, low cost, relatively easy detection, and potentially low cell loss.</p> <p>Dr. Jean Paul Thiery, a French researcher and the Chief Scientific Officer of Biopolis at experimental therapeutics centre in Singapore, indicated that sensitivity of separation system higher than 10^{-7} (one target cell in 10^7 non-target cells) is very desirable. And the 10^{-7} level of sensitivity was achieved by the proposed disk, with robust yield.</p>
<p>Market Potential</p>	<p>The study on rare cells has been an important issue in basic and clinical studies. A large number of studies have indicated that the amount of some specific rare cells in the blood can serve as markers for diseases or treatment, e.g. disease diagnostics, evaluation of treatment efficacy, and disease prognosis.</p> <p>Except CTCs and fetal cells, there are still many specific cells with distinct immunological feature in the whole blood. So the positive CD-based microfluidic system could be used to separate and detect the specific cells in clinic.</p>
<p>IP Right(s)</p>	<p>Patent pending</p>