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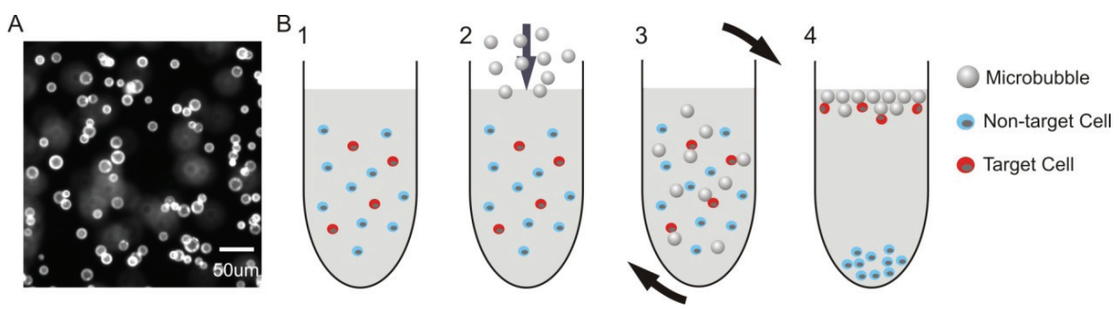
PRESS RELEASE

Fast sorting of CD4+ T cells from whole blood using glass microbubbles

This report demonstrated a new cell sorting technology for isolating CD4 positive T cells which may be used for HIV disease monitoring in resource-limited areas such as the developing countries in Africa.



(A) Image of glass microbubbles labeled with PE-conjugated biotin. (B) Schematic of buoyancy activated cell sorting (BACS). Surface-functionalized glass microbubbles bind to target cells after a brief rotary mixing (1–3). Cells attached by glass microbubbles float and are separated spontaneously by buoyancy (4).

Human immunodeficiency virus (HIV) disease represents a global health problem concern in the world especially in many areas of Africa. According to the Joint United Nations Programme on HIV and AIDS (UNAIDS), there were 24.7 million people living with HIV in sub-Saharan African in 2013 but only 37% of the patients were treated. Despite the support of global efforts to fight HIV, the outcome has not been successful because the cost of HIV medications is still an obstacle to getting most patients on therapy in the developing countries where the majority of the whole populations have very low incomes compared to the western countries.

For human immunodeficiency virus (HIV) infected patients the number of CD4+ T lymphocytes in peripheral blood is an important maker for monitoring disease progression of AIDS and treatment efficacy. But the standard methods for enumerating CD4+ T cells by using fluorescence-activated cell sorting (FACS) or magnetic-activated cell sorting (MACS) are expensive and not easily accessible in remote areas. Our report shows an alternative method for isolating CD4+ T cells which can be used for CD4+ T cell enumeration.

One critical advantage of glass microbubbles is their reduced cost. These glass microbubbles have been mass-produced for use in many industrial applications including insulation, construction, paints, and transportation. The surface of the glass microbubbles can also be modified for attaching a variety of biochemicals to, using readily available protocols developed for glass substrate. In addition the buoyancy of the glass microbubbles allows for the capturing and separation of target cells from the unwanted cells by a simple "flip tube" motion. Together these features make our technology very attractive to the development of low-cost point-of-care devices for HIV monitoring.

There are currently huge inequities in HIV disease burden between developed and developing countries due to the fact that in many developing countries the health care is facing tremendous challenges from not having sufficient financial resources to support the health care of HIV patients. The production of new health technologies may help to bridge this gap by lowing the cost of medical care to provide better treatment to the patients.

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