Biochip for separating fetal cells from maternal circulation

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Abstract: Isolation of fetal cells from maternal circulation is the subject of intense research to eliminate the need for currently used invasive prenatal diagnosis procedures. Fetal cells can be isolated using magnetic-activated cell sorting or fluorescence-activated cell sorting, however no technique to specifically isolate and use fetal cells for genetic diagnosis has reached routine clinical practice. This paper demonstrates the use of a micromachined device to separate fetal cells from maternal circulation based on differences in size and deformation characteristics. Nucleated fetal red blood cells range in diameter from 9 to 12 μm can deform and pass through a channel as small as 2.5 μm wide and 5 μm deep. Although the white blood cells range in diameter from 10 to 20 μm, they cannot deform and are retained by the 2.5 μm wide and 5 μm deep channels under our experimental conditions. Fetal cells were isolated from cord blood and DNA analysis confirmed their fetal origin with ruled out maternal contamination.
Author Keywords: Biochip; Cell sorting; Prenatal diagnosis; Size separation

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