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Use of Novel Microfluidic Devices to Detect Biomarkers in Blood

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Blood analysis is highly important in both medical and scientific fields. Traditionally, blood analysis requires a vial of blood and several processing steps resulting in a time consuming and difficult process. The aim of this research is to find a portable and inexpensive device to carry out fast blood cells separation, count and analysis. Previous work show the capability to analyze and separate blood cells using microfluidic devices resulting in less sample volume and shorter analysis time. Most microfluidic devices share similar fabrication process and materials (soft lithography process in polydimethylsiloxane (PDMS)). ELISA (enzyme-linked immunosorbent assay) is the most common method that these devices use. Microfluidic devices have antibodies microarrays and these antibodies will attract/bind to specific viruses or cells enabling the detection of specific diseases.

Sometimes allergies can't be diagnosed by the common skin prick test and a blood test is needed. The available blood allergy test is more expensive and takes more days to obtain the results than the skin test. Microfluidic devices using ELISA can measure the blood level of immunoglobulin E (IgE). The IgE are antibodies that the body may make in response to certain allergens. Therefore microfluidic devices can be use to make blood allergy tests in a less expensive and time consuming manner than currently allergy blood tests.

Psychological disorders such as bipolar disorder, major depression disorder, posttraumatic stress disorder and schizophrenia, are commonly diagnosed by the physician's judgment based on the patient description of his symptoms. Sometimes it is difficult to get an accurate diagnosis or determine the severity of the patient's condition based on this. An accurate genetic blood test it can guarantee that the patients are getting the right medication in the proper dosage amounts and that the patients will search the help they need because mental disorders would be viewed the same as any other medical condition. Researchers identified some genes and proteins that are candidate biomarkers for these disorders. However, these are only suggested biomarkers and the selectivity and sensitivity of these need further testing and investigation in order to be able to obtain accurate diagnosis of mental disorders using blood tests.