

Red Blood Cell Concentration Measurement Method Using Two Cell Counters

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Here, we present a novel cell concentration measurement method that can be used to count cells in a fixed control volume. Previous cell concentration measurement methods (e.g., those using a Coulter counter and a flow cytometer) can be used to count cells in a given fluid volume or at a known flow rate. Thus, the accuracy of the cell concentration measurement depends on the performance of external facilities, such as accurate fluid volume and flow rate controllers. However, the proposed method based on the measurement of the number of cells in a fixed control volume can measure cell concentration without requiring accurate fluid volume measurements or precision flow rate control. Using the fabricated devices, we realized two different measurement methods: 1) a cell concentration measurement method using a single cell counter and a fixed flow rate (conventional method), and 2) a cell concentration measurement method using two cell counters and a fixed control volume (proposed method). Compared with the conventional method, which showed cell concentrations ranging from 1.18×10^5 to 3.28×10^5 cells/ml under various flow rate conditions, the proposed method shows a maximum error of 5.32%, which is within a hemacytometer's standard deviation. Finally, we have not only enhanced its simplicity but also reduced its size and cost, because our device requires no expansive flow sensors or accurate pumps.

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