Supplementary Information

On Chip Analysis of CNS Lymphoma in Cerebrospinal Fluid

*Anna Turetsky*, Kyungheon Lee*, Jun Song*, Randy J. Giedt, Eunha Kim, Alexandra E. Kovach, Ephraim P. Hochberg, Cesar M. Castro, Hakho Lee, and Ralph Weissleder

*equal contribution

*Design of microfluidic platform:* The fluidic system has a single-layer structure that is composed of a capture site region, a fluidic channel, and a debris filter at the inlet. Injected fluids (e.g. cells, buffers, antibodies) first pass through the microfilter array (200 µm in diameter) in order to filter large aggregates and debris. The fluids then pass through the capture site region (12000 µm in width; 5800 µm in length). Figure S1 (top) shows the detailed dimensions of the single-cell capture sites, which were designed to capture lymphocytes ~10 µm in diameter. There are two capture regions with different gap sizes ($W_1 = 30$ µm and 16 µm; $L_2 = 40$ µm and 25 µm) to enhance the capture rate. Figure S1(bottom) shows the schematic of a column filter at the sample inset, that removes large debris and cell aggregates. The height of the fluidic channel is 25 µm.

Figure S1. Fluidic structures in microfluidic chip. (Top) Design parameters for the capture sites: $W_1 = 30$ µm and 16 µm; $W_2 = 10$ µm; $W_3 = 14$ µm; $W_4 = 4$ µm; $L_1 = 15$ µm; $L_2 = 40$ µm and 25 µm. (Bottom) Structure of the on-chip column filter. $D_f = 200$ µm and $W_f = 800$ µm.
Table S1. Cell Counts in CSF

<table>
<thead>
<tr>
<th></th>
<th>Normal&lt;sup&gt;1&lt;/sup&gt;</th>
<th>CNS lymphoma&lt;sup&gt;2,3&lt;/sup&gt;</th>
<th>Inflammation&lt;sup&gt;4&lt;/sup&gt;</th>
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</thead>
<tbody>
<tr>
<td>B cells (per mL)</td>
<td>0-30</td>
<td>10-500,000</td>
<td>200-43,000</td>
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<tr>
<td>T cells (per mL)</td>
<td>150-2,000</td>
<td>250-180,000+ (max 97.2%)</td>
<td>9,000-460,000</td>
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<tr>
<td>Monocytes (per mL)</td>
<td>80-1,100</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Granulocytes (per mL)</td>
<td>20-430</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>NK cells (per mL)</td>
<td>0-50</td>
<td>max 7.4%</td>
<td>1,500-50,000</td>
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</table>


**Table S2.** Antibodies used in the current report.

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<tr>
<th>Antigen</th>
<th>Clone</th>
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<td>HI10a</td>
<td>BioLegend</td>
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<td>Brilliant Violet 421</td>
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<td>JDC-12</td>
<td>BD Biosciences</td>
<td>Alexa Fluor 647</td>
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